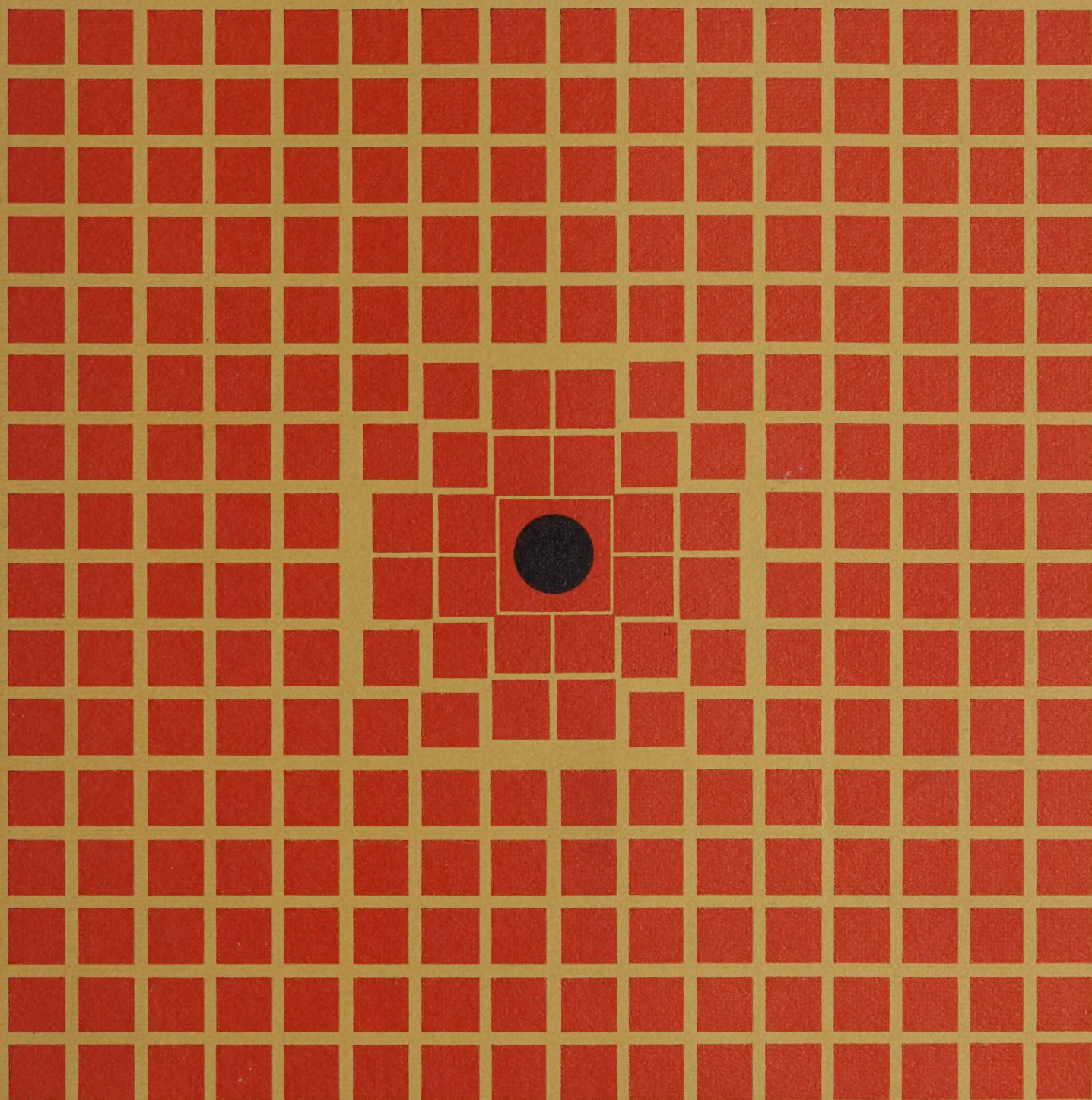


FORCES SHAPING THE ROLE OF THE ARCHITECT



PROCEEDINGS SECOND BOSTON ARCHITECTURAL CENTER CONFERENCE MAY 1966

FORCES SHAPING THE ROLE OF THE ARCHITECT

PROCEEDINGS SECOND BOSTON ARCHITECTURAL CENTER CONFERENCE MAY 13 AND 14, 1966, BOSTON, MASSACHUSETTS

© Boston Architectural Center, May 1966 Library of Congress Card Catalogue Number 66-30308

Published by the Boston Architectural Center with a grant from the Graham Foundation for Advanced Studies in the Fine Arts.

TABLE OF CONTENTS

5 LIST OF PARTICIPANTS

7 FOREWORD: Sanford R. Greenfield

FRIDAY, MAY 13

WELCOME: Paul J. Carroll

9 SEMINAR ONE

Forces Shaping the Role of the Architect

Arthur Trottenberg, Chairman
John P. Eberhard
Gerald W. Blakeley
Otis Mader
Edward J. Logue

Questions

SATURDAY, MAY 14

21 SEMINAR TWO

Education of the Architect

Introduction: Arcangelo Cascieri

G. Holmes Perkins, Chairman
Burnham Kelly
Charles Burchard
Romaldo Giurgola

Questions

33 SEMINAR THREE

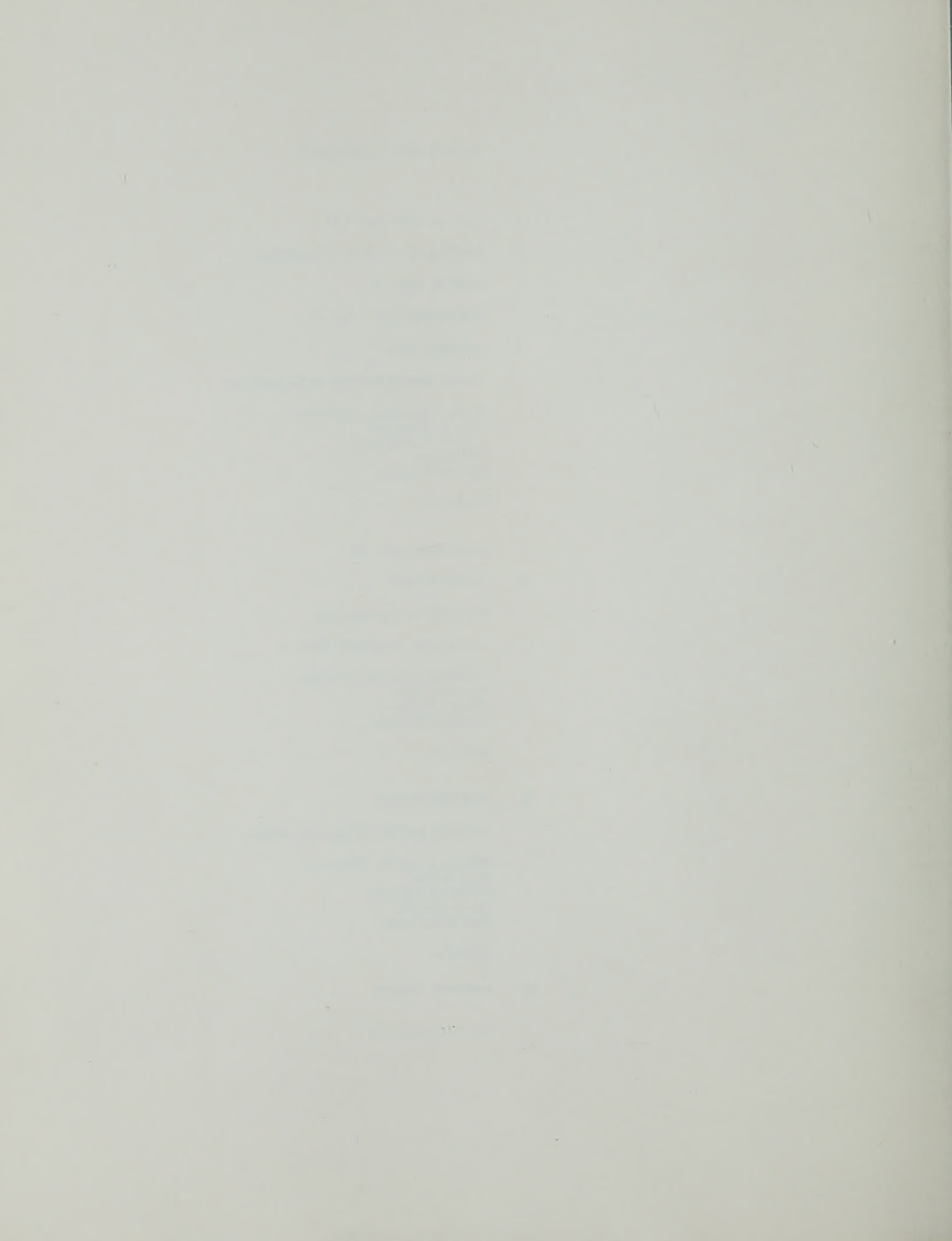
Research and New Areas of Knowledge

Bernard P. Spring, Chairman
John McHale
Donald A. Kennedy
Warren Brodey
Ezra Ehrenkrantz

Questions

43 EVENING DINNER

Morris Ketchum, Jr.



LIST OF PARTICIPANTS

JOHN P. EBERHARD, AIA
Deputy Director
Institute for Applied Technology
National Bureau of Standards

EZRA EHRENKRANTZ, AIA
President
Building Systems Development, Inc.

ROMALDO GIURGOLA, AIA
Chairman, School of Architecture
Columbia University

BURNHAM KELLY
Dean, College of Architecture
Cornell University

DONALD A. KENNEDY, Ph.D.
Cultural Anthropology
Senior Instructor in Preventive Medicine
Tufts University

MORRIS KETCHUM, JR., FAIA
President
The American Institute of Architects

EDWARD J. LOGUE
Development Administrator
Boston Redevelopment Authority

OTIS MADER
Director of Development
ALCOA

JOHN McHALE
Executive Director
World Resources Inventory
Southern Illinois University

G. HOLMES PERKINS, FAIA
Dean of the School of Fine Arts
University of Pennsylvania

BERNARD P. SPRING, AIA
Senior Research Architect
Princeton University

ARTHUR TROTTEMBERG
Assistant Dean for Resources and Planning
Faculty of Arts and Sciences
Harvard University

GERALD W. BLAKELEY, JR.
President
Cabot, Cabot and Forbes

WARREN BRODEY, M.D.
Research Laboratory for Electronics
Massachusetts Institute of Technology

CHARLES BURCHARD
Dean of the College of Architecture
Virginia Polytechnic Institute

PAUL J. CARROLL, AIA
President
Boston Architectural Center

ARCANGELO CASCIERI, FAIA
Dean of the School of Architecture
Boston Architectural Center



Digitized by the Internet Archive
in 2022 with funding from
Boston Public Library

<https://archive.org/details/forcesshapingrol00bost>

FOREWORD

SANFORD R. GREENFIELD, AIA

The title for the Second Boston Architectural Center Conference, "The Future of Architecture," has been changed in publication to "The Forces Shaping the Role of the Architect"—the title of the first Seminar. However, the abstracts from each panel included here, as well as the few remarks I have chosen to make are all concerned with the future role of the architect.

The panelists in Seminar I represent Government, the Developer-Package Concept, Industry, and Systems Analysis in Design. They are not "forces" as such, but activities or tools with which the profession has already become involved. In this seminar Mr. Logue states that government is one of the most significant forces shaping the physical environment. However, lawyers rather than architects will be the more effective instrument in shaping the cities of the future, because it is prestigious for those of the law profession to serve in government, while architects have not yet found a desirable nor effective way to participate at this level.

Also in Seminar I, John Eberhard states that systems development in management and in the construction industry is likely to be the dominant approach to rebuilding our cities, and will replace the traditional manner of operation—and perhaps even replace the private-practicing architect as we define his role today. Eberhard also challenges the educator's usual modes and materials of architectural education when he says that we shall need men who have been trained to conceptualize strategies and to simulate design solutions that will evolve in contexts other than that of craftsmanship, or case studies as now practiced.

Seminar II was designed to provide presentations about the role of education in determining the future of architecture. Dean Kelly recognizes the need to bring within this realm people who are working for advanced degrees and doing research in specialized areas. These are people who would understand the importance of visual forms, yet accept a role in the profession not "to build houses or office buildings," but to be clinical practitioners, or architects who practice with others of their profession and not with the public directly.

Seminar III was a free-wheeling discussion that maintained audience interest long after its allotted time. Bernard Spring keyed the discussion when he pointed out that each time a design decision is made there is an implicit prediction about future human behavior. How good our predictions are we do not know because we have no way of evaluating what has happened in our buildings. What happens to people's lives and minds in the places we build for them? Dr. Kennedy proposes that architects become more understanding of what research means in other disciplines. How can architects build up a body of knowledge that each succeeding generation can add to as well as utilize for its own work? Psychiatrist Warren Brodey spoke of a "soft architecture" that contained the potential for immediate and constant adaptability to human psychological and biological requirements. Not change or flexibility by means of a loose fit, but an organically changing architecture in which the physical environment is capable of perceiving and responding to human needs by means of automated devices built into our spaces.

Post conference reflection indicates that there may be more than one role for the architect in the future. There are those who prefer to see the traditional goals and character of the profession remain unchanged. They are anxious that the architect

may become overly concerned with problem-solving techniques, and renounce his traditional role of making value judgements. They believe the essential function of the architect is to be concerned with human purposes. Moreover, they hold the view that space changes human purposes and the building itself becomes a part of the problem-solving device, not merely a shell to house the solution to a problem. For this group the strength of the architect lies in developing those attributes which permit him to operate as a form-giver, to conceptualize visually, to be sensitive to detail, and to enlarge those capabilities which permit him to best express in physical forms the "spirit of the times." On the other hand, there are those while in agreement that great buildings may change the constraints of the problem, recognize our most urgent needs to be the development of a methodology which will raise the general quality of buildings, and to find and utilize tools—such as the computer and systems analysis—which will help us to deal with highly complex problems too great to be dealt with by intuition alone. Here there is the fear that the architect will be diminished to the role of stylist, while the serious tasks of our generation shall be answered by those who have the tools to attack the complexity of the problem.

It would seem to me that not only the role, but also the concept of our profession must be changed. As a start, it could be broadened to include individuals with varying aptitudes, verbal and abstract, as well as symbolic—to use Burnham Kelly's terminology. They would be architects, not only in private practice, but professionals who would operate in many different kinds of decision making capacities, in different areas of activity such as government, industry, and management, to name a few. This kind of architect would participate in making decisions affecting the built-in environment as part of the prevailing power structure as an elected legislator, or government functionary on local, regional or national levels. Another might participate in the creation and development of forms as a member of an industrial organization, not as an outside consultant, but by being familiar with methods of production, materials and processes of development, merchandising, distribution, and management. Still another would formulate and participate in the development of research from which we learn about the behavior of the users of buildings before and after interaction with their new environment.

The education of the architect must become cognizant of these goals if they are to be reached. The solution to the dilemma of the changing role of the architect may never be solved until it is properly identified. Although no one can deny the need for the architect to continue making value judgements and creating new forms, we must recognize that the traditional problems have been replaced by more complex ones, requiring new tools, new techniques, and a new understanding of the architect's role.

It was the intention of the Second Boston Architectural Center Conference to bring some of these questions to the surface, and to help identify the problems with which an increasingly complex scene challenges the profession. The success of the Conference is due to the architects who actively engaged in the formulation of the seminars, who met with me many times to discuss the ideas and potential content of our forum. They are Peter Floyd, John Nickols, Harry Portnoy, and Robert Wolf.



**FORCES
SHAPING THE ROLE
OF THE ARCHITECT**

SEMINAR ONE

PAUL CARROLL
President of the BAC

I'm pleased to welcome you to the Second Boston Architectural Center Conference entitled THE FUTURE OF ARCHITECTURE. In our first conference, ARCHITECTURE AND THE COMPUTER, we concentrated on a single theme, and explored it in depth. However, now we have chosen a broad subject area. We hope in this way to capture some of the philosophical thoughts of the profession.

With the opening of this new building, we feel it is appropriate to look at the future. For 75 years the Boston Architectural Center has operated as an evening school. This has been accomplished through the voluntary teaching and assistance of the profession. Students work in offices during the day, and attend classes here three nights a week. This program extends for five years and a thesis is required. After successful completion of all courses, a certificate is awarded. Over 2,000 students have attended our Center since 1946.

The Center now plans to strengthen its program and to institute programs of continuing education for practitioners as well as continuing education to supplement and reinforce job experience for interns. We will encourage all organizations and persons involved in shaping the environment to meet in this building for the exchange of ideas and information. This, coupled with lectures and exhibits for the general public, will be of great benefit to the community.

The role of the architect is changing because of the complexities involved in guiding and rebuilding our cities. The demands on his talents are great. If he is to be effective, he must be aware of his new function and be prepared to marshal all the resources available. To this end, we propose to discuss in three seminars the FUTURE OF ARCHITECTURE. First, Forces Shaping the Role of the Architect; second, Education of the Architect; and third, Research and New Areas of Knowledge. Any one of these seminars could easily be the subject for a complete conference and one may well be the topic of our next annual conference. We are fortunate to have as Chairman of our first panel the Assistant Dean for Resources and Planning, Faculty of Arts and Science Harvard University, Dean Arthur Trottenberg; and it is my pleasure to introduce him to you this evening. APPLAUSE.

ARTHUR TROTTEBERG, Chairman

We have an exceptionally heavy mandate tonight. The subject Forces Shaping the Role of the Architect is so vast in scope that perhaps our only hope of coherency is to stick quite closely to the specific questions at hand. As I read the program I see "What is happening to the traditional role of the architect? Will it be reserved only for the rich and for those who commission buildings of a monumental nature? Must the profession split into two halves? One concerned with conceptual design, and the other with implementation?" Now, I shall admit to some unhappiness with the restrictive nature of these questions. It seems to me that Forces Shaping the Role of the Architect is a broad and complex question, and to limit this discussion in terms of quasi economics or engineering may not be as enlightening as it could be. Perhaps we can enlarge on it later.

When I talk to architect friends today I frequently am struck by how far we have come from those happy and seemingly all conclusive statements of the past. You remember the slogan: "Form follows function" of Louis Sullivan and the statement of La Croussiere that "a house is a machine for living;" or that felicitous phrase of Mies van der Rohe, "less is more." Now slogans and cleverly expressed creeds are obviously not sufficient to arm the modern architect to face the complexity of our new environment. I don't know frankly where the architect is going to find this guidance. I think the best phrasing of the current dilemma can be found in a famous essay of Louis Mumford's, published many years ago, entitled "The Case Against

Modern Architecture." He said, and I quote: "The Modern architect has yet to come to grips with the multi dimensional realities of the actual world. He has made himself at home with mechanical processes which favor rapid commercial exploitation and with anonymous repetitive bureaucratic forms like the high rise apartment or office building which lend themselves with mathematical simplicity to financial manipulation. But he has no philosophy that does justice to organic functions or human purposes and that attempts to build a more comprehensive order in which the machine instead of dominating our life and demanding ever heavier sacrifices in the present fashion will become a supple instrument for humane design to be used, modified or on occasion projected at will."

Our panel tonight is unique. A number of us are not architects and yet we will discuss in all profundity the Forces Shaping the Role of the Architect. On second thought, however, perhaps it is a good idea. Our panel tonight is at least composed of activists, people who in the role of client, or intermediary between client and architect, are obliged to see that designs are prepared and executed, hopefully within a budget. In one sense they are uniquely equipped to engage in some bone picking here tonight. They are unique in another sense, however, they all share a very common concern for the quality of design. Budgets, construction costs, and the rentable quotient of a square foot of space are the tools in some ways and the people on this panel understand very well indeed the larger dimensions and the gestalt aesthetic of design and planning.

We are going to ask each participant to speak for approximately fifteen minutes and then we hope to have a dialogue among members of the panel, and then open the discussion to questions from the floor. In the interest of time, I won't introduce the speakers except by name; you have their biographies in the program. Our first speaker is Mr. Otis Mader, Director of Development at Alcoa.

OTIS MADER

Mr. Chairman, friends of the panel, and distinguished audience. Tonight is Friday the 13th and there is a rather special reason why I am happy to be here tonight that I would like to explain to you. Exactly 25 years ago today I stood in the hallowed halls of what was then the Administration Building at MIT over on Mass. Ave. I assume that is still the "in" way to refer to Massachusetts Avenue here in Boston. I had recently swindled a Bachelor of Architecture Degree out of Ohio State University, and then discovered that my draft number was one of those very lucky ones in the first hundred pulled out of the basket for FDR. At that time the armed services were vacuuming up officer candidate material wherever they could find it, and most anyone with a degree who could use the C scale of a slide rule could qualify. I chose the United States Naval Reserve and was immediately commissioned and made an ensign, told to buy a sword, and report to MIT across the river for further training. On that May 13th 25 years ago I did report to MIT and was told that in 90 short days they were going to make me a Naval Architect so that I might build fighting ships and make U.S. convoys safe from the German U boats. Quite honestly, about all I accomplished in those 90 days was to salt up my vocabulary by substituting ladder for stairs, galley for kitchen, head for toilet and so forth. I decided that some secretary had gotten me mixed up

and didn't recognize that there was a tremendous difference between an architect and a naval architect. At any rate, some five years later the Jap Navy surrendered and I was permitted to hang up my sword and resign, having in the meanwhile acquired a wife and two hungry sons and having managed to forget all I ever knew about design and structure. I lacked the courage to try the State Boards and hang out a shingle, so I sold out to industry; and I must honestly say that I never have been sorry for that decision. My rewards have been many and one of those rewards is the pleasure of addressing you tonight as a member of industry. The Forces Shaping the Role of the Architect is a subject of such formidable proportions that I shall not pretend to speak for all of industry or all of the construction industry, or even all of the aluminum industry. I am not entirely confident that I can accurately transmit to you the consensus of my own company's beliefs but please let me try.

At some time or another in the past, I am sure that each of you has been subjected to the hot promotional breath of an all aluminum house, an all concrete office structure, an all steel industrial building, an all wood demountable school, or something of this sort. I think you will be happy to hear that such ventures seem to be finally dying of their own weight. They were born originally of the material manufacturer's desire to demonstrate the use of his product in new applications and for this purpose they probably had a reasonable degree of success. But, indirectly, the "all something" projects, as we call them in industry, nurtured the first early efforts at componentizing.

These "all something" campaign projects I'm sure appeared to you gentlemen and ladies of the architectural fraternity as rather horribly bad taste. In many cases the module selected was the dimension of the biggest hunk of stuff that we could get down the production line, and as such it rarely bore relationship to other required components or to such unimportant things as the size, shape and motivation of the human body. In some instances, proposed components and systems once erected literally defied the architect and the engineer to make reasonable provision for light, air, heat, water and communication. Despite these early abuses, and a lack of understanding of the total problem, the drive for componentization survived and today is gathering strength at a very rapid rate.

There are a number of changes occurring in the business philosophy of the building materials industry that are contributing greatly to this belief in componentization and to understanding of the total problem. The first of these changes is that the building material manufacturer now admits, almost universally though in some cases still grudgingly, that his material alone, though excellent for specific purposes, cannot fill all building needs well, indeed cannot fill most building needs well alone. Therefore, his thinking on componentizing takes usually one of four paths. He may purchase a product from another manufacturer and combine it with his own for componentizing. He may sell his own product to another manufacturer who would do the combining. Or, Company X may join Company Y to form Company Z which will then combine the products of both into a product for the third to sell. The fourth path is for an individual firm to diversify its manufacturing into other basic materials which might then be combined with the original to come up with preassembled components.

A second major change in business philosophy, and I mean

not just the building industry but industry in general, is the newly discovered and rapidly increasing interest and participation in real estate, urban development and city rehabilitation. Now while the altruistic purposes of upgrading communities undoubtedly and genuinely brings great corporate satisfactions and pride and does enhance the image of the firm, still it is a cold hard fact that such participation, whether by company investment directly or investment of the company's pension fund, would not be occurring without the prime mover of a long-time profit at a reasonable risk. The relatively high figures for corporate cash flow and the present situation on corporate tax makes industry a very interested and economically able investor.

Where such an investing industrial firm is also allied in business with the building industry, it cannot avoid broadening its base of building knowledge. This new type of endeavor can develop more complete understanding of the architect, the engineer and the contractor; their feelings, their desires, their efforts, their frustrations, the kind of people they really are. The need for effective use of land is driven home simply by the hammer of economics. The company land owner or property owner can become acutely aware of the causes and costs of construction delay, particularly when he finds that he himself has caused them with his own material. This can happen. He can resolve into dollar figures the effects of a shorter building cycle to occupancy. Such a company understands as never before the need for balance in the equation that contains the factors of first cost and quantity, performance, quality, operating costs, revenue, return on investment.

As a landlord he gets first-hand experience of what it takes to get a tenant and what it takes to keep a tenant. He learns how building materials are regarded by John Doe, the tenant, the renter. And he is shocked to find that John Doe quite frequently not only hadn't noticed, he couldn't care less. This front-line experience in the use of building products is often a revelation and not always a favorable one. In any event it does lead to progress and to improvement. Unavoidably he becomes aware of the importance of other materials from his own sphere of manufacture, of the advantages and disadvantages of those materials, and most of all of their effect on and interrelationship with his own building components.

Lastly, and probably most important, he can become better equipped to search for the true value, the true meaning, true description of integrated systems of components. He can realize how complicated this component problem is made by the unavoidable interdependence with other component systems and with uncomponentized base materials. At this point it becomes obvious that the growth and the success of componentizing depend largely on the development of industry-wide goals and standards, rather than the narrow views of a single entity in the industry. The third basic change in business philosophy in the building industry is an apparently increased willingness to work together as an industry and through separate associations inside the building industry. Now certainly competition is as head-knocking as it ever was—it seems to get worse every year—but in spite of this, there are today more group studies and more group action taken in one twelve-month period than had occurred in all of the previous five or six years. One of the main things being discussed today is how better to organize the monstrous

availability of research and development facilities for the good of the total industry.

This improved spirit of cooperation is also stimulating an increased interest and stronger effort toward the so-called industrialized building. To date the industrialized building concept has been more or less commercially limited to applications of light commercial buildings, occasional temporary or portable school buildings and certain fragments of the residential market. Interdependence of materials or components has not been a problem in this particular area because the majority of such buildings are a total product of a single company. It does not seem that the concept of a multitude of totally proprietary building systems could effectively include the larger buildings that satisfy the more sophisticated needs of the central community—such buildings as hospitals, offices, apartments and hotels. Since they do, however, function excellently and economically for the specific purposes for which they are being promoted, their market can be expected to continue to grow and expand within its present parameters.

Now at the opposite end of the scale are the major buildings in the country today that represent pinnacles of investment in size and purpose and anticipated life span. To name a few, your own Prudential Center here in Boston, the coming World Trade Center in New York, the John Hancock Building in Chicago, Wells Fargo in San Francisco and the Rocket Assembly Building at Cape Kennedy. We can hardly expect projects of this immensity to move rapidly toward industrialization in the usual sense of the word. Their sheer size, combined with repetition of module, does in fact already permit a considerable degree of custom industrialization in the sense of manufacturing and erection efficiencies that can be devised and justified economically for each single project. There is no doubt that componentizing will find a growing place in such construction but, as an influence on design in this area, I suggest that it will be a long while before it becomes a primary influence.

Examining both ends of this spectrum, as I have just done, is the easy part of forecasting industrialization of buildings. What then of the great and varied middle ground that represents the majority of the market, whether measured by square feet or by dollar investment? It is in this area that we might expect to find the most rapid and the greatest change of any of the construction areas in moving toward industrialized construction. Now you notice that I say "toward" because I frankly do not envision a broad growth of manufacturing plants to crank out total erector sets of sticks and panels and gunk that create instant building when you pull the zipper. Nor can I get very excited over the possibility of the stack of boxes technique and what it might do for mankind. Maybe in this respect I've been swayed unfavorably by the appearance of those absolutely horrible Russian apartments that we see so often in the engineering magazines. A progressive and yet reasonable path to follow may well be the one that Ezra Ehrenkrantz is already blazing. There will undoubtedly be many detours and side roads to this path that can be justified. But an awesome number of efficient, economical, durable and flexible buildings must be built in the next decade, and it simply makes sense to the industrial mind to think in terms of the broad selection of correlated components from which subsystems can be assembled with a combination of subsystems possible to create a total building system.

Now would this degree of industrialization be good or bad? Would it lower costs? Probably. It would shorten the start to finish time almost certainly. Would it increase quality and dependability? It should. Would it be flexible? It can be if the componentizing and the system designs are properly done and well handled. Would an architect be needed? The components cannot plan themselves. They cannot interpret the owners' needs. They cannot exercise judgement. They cannot demonstrate taste. True, considerably less architectural time should be involved, particularly if parts of the design and layout could be computerized. Less architectural time—is that bad? I have an answer and I really don't know if it's valid or not, but it seems to me that if the architect can save some of the time that he currently must spend on a morass of details, he may then be free to face the biggest problem of all which is how to make our cities liveable once again, how to integrate building to building, and complex to complex, and living to working, working to play, and transportation to all the rest. Thank you. APPLAUSE.

ARTHUR TROTTERBERG

Our next speaker is Mr. John Eberhard, Deputy Director of the Institute for Applied Technology of the National Bureau of Standards. Mr. Eberhard is going to address himself to a concept of systems.

JOHN EBERHARD

I'd like to spend a few moments with you tonight discussing design as an intellectual activity of man, and particularly to address myself to the design of buildings, that province of intellectual involvement generally coveted by those who call themselves architects. It seems to me fitting that since I am participating in the dedication of the new Boston Architectural Center that I use those three words, Boston, Architectural, and Center, to attempt to describe to you my concern about the forces shaping the role of architects in the balance of this century. Boston is symbolic of the major force, the urbanization of our society and in fact the balance of the world. The word architectural is symbolic of that gentlemanly profession of the 19th century which is now of diminishing usefulness but which sets up within its ranks a resistive force to change, just as the gentleman farmer resisted the agricultural revolution of the mid-20th century—a revolution which precipitated the high technology food production industry in this country which is still nostalgically called farming. The word center suggests the conceptual boundary of these two forces. For it is the central city which is precipitating the need for a new technological revolution, which will sweep away the old concept of the architect as the central focus of the building process. The impact of this statement, if it is believed, must be reckoned with by those who shape the educational programs of this Center and other schools like Harvard and MIT and especially, in my opinion, the Massachusetts Institute of Technology.

In order to elaborate a little more on the forces of urbanization, I'd like to read to you a quotation from an address delivered earlier this year by my good friend and former colleague, Thomas Boylston Adams. Mr. Adams, in opening the great Copley exhibition at the Museum of Fine Arts, had this to say about the city: "Every man carries in his heart the image of a city. For Pericles it was Athens. For all the Caesars, Rome. For Thoreau, it was Walden. For Augustine, it was the City of God. Whether a man's

city is peopled with angels or with woodchucks with the soul of angels, whether it supplies all the delights of the flesh the soul of man can desire, whether its streets pulse with trade and the tread of armed men and the tentacles of its power reach to the outermost ends of the earth, or whether on its acropolis is born art worthy of the admiration of the gods, the thing that a man leaves to his posterity is the image in his heart. The city of his being will crumble at last with the dust from which it came or at the very most if it remains a center of human activity, his ways will know him no more. Every familiar landmark will change or the perspective for viewing it will change so that it will no longer seem the same but the idea that animates will live." Such a city is Boston. It's an idea which fires itself in the images of our hearts but the forms and shapes of this image are changing rapidly now.

Some of the men who share this platform with me tonight are central to the forces which are bringing about these changes here in Boston. This Center itself is indicative of the impact which technology and design are having on the shapes of our cities. The image or concept of what a city is or what a city may become will have a powerful influence on the design process and the technology available to designers. Technology is the foundation of the process of city building which underlies the spectrum of the palette of the designers. If this palette is limited, the designers concepts may expand the palette only in direct proportion to the forces of their ideas and the linking mechanisms which they have established with other powers capable of inducing change. My thesis tonight is that our designers, be they industrial designers working on the hardware of the city, architects working on the buildings which plug into this city, or urban designers working on the city itself, have only weak links with the process of city building. Because of these weak links their imaginations exceed the limits of their power to induce change and hence they are underachieving and being under-utilized in a world which needs their skills, their talents and their dedication.

Now let me speak more directly about architects. The process of building in America by the end of this century again as many buildings as we have now, the process of providing adequate shelter for millions in newly developing countries around the world, the process of rebuilding our major cities to make them places we will want to leave to our children, are highly complicated design problems. To suppose that society could delegate the design responsibility of these processes to one select group of men with a reasonably uniform educational background would not only be arrogant, it would be impossible. Alternatively, to assume that it is possible to superimpose some sort of intellectual grid over this process and to assign architects an exclusive portion is not reasonable because of the difficulties in defining the boundaries of this responsibility. Design is an integral part of the process of solving any problem, from playing checkers to building cities. Therefore, let's examine design as such in a little more detail.

Design begins as an activity in the mind, a mapping out of a strategy or the simulation of a solution to be worked out in physical terms. I would suggest it might be thought of in four steps. First, the conceptualization in the mind. I have practiced architecture, I have experienced that moment the architects strive for when the great idea bursts into your mind full-blown, when you have all of the total concept in three dimensional simulation

within your mind. But that's only the first step. Obviously there is a second step and this is recording the concept for execution by designers or others. This we do technologically now by models, by drawings and by blueprints. Third is the development of a strategy for realizing the concept. This is a part of the design process. This is the kind of work which bankers and contractors are involved in. And finally there's the step of actually working out the concept in physical terms. A piece of work that was initiated by the conceptualization of the designer is not fully realized until the product is produced.

The designer who brings all the forces of the building industry into focus is effective only to the extent he can influence or utilize well the myriad of design decisions made in the total process. It is presently not possible to link these activities into a manageable process which is capable of self-improvement. We are not at a loss, however, for ways to begin thinking about how to make this process a manageable one and how in turn to relate the designer to the process. We have developed in the last three decades in this country organizational methodologies that make it possible to put together large scale efforts in systems development. The development of the Polaris submarine as a weapons system or the efforts of NASA in mounting the pilot project to land a man on the moon are instances of this methodology. I would suggest in fact that the development of the large scale, high technology methodology is the major spin-off which the city building industry is likely to receive from our weapons and space efforts. The force of this concept is likely to be the one major factor which displaces the present concepts of the building industry as an institutional way of converting raw materials into physical environment.

My friend and present partner in our Institute for Applied Technology, Don Schon, has written a book he calls "The Displacement of Concepts." Let me illustrate what this means as a tool for change. First, when a child learns that the letter "A" is more than a decoration on the side of his toys, but in fact is a concept which when properly related to the other 25 letters of the alphabet makes it possible to form written words, he has a new communication tool. The concept existed before, outside of his experience, but once he grasps it, he is substantially benefitted and exposed to a whole new world. Second, in the same way, De Tocqueville suggested that once the American slave realized that he was not required to be a slave, when he grasped the concept of equality, then a powerful force would be unleashed. The concept existed before the 1860's but the gradual displacement of the concept of being a slave with one of being an equal is even now being felt in our society. This is what I mean by the displacement of concepts. Now I won't pretend that the systems concept is as powerful an intellectual tool, at least not yet, as these two examples. But I see it at work now in our society and I would predict that it will substantially alter if not altogether displace existing concepts of organizing or relating the varied activities now loosely joined to produce our buildings.

The building process when viewed as a system is one which begins with raw materials. When a tree is cut into boards, the eventual design alternatives are already limited. The same is true when the metallurgical properties of steel have been fixed by producing a particular steel ingot. Or for alumina once it has been made into aluminum. The shaping of raw materials in the fabricated shapes, the combining of these shapes into com-

ponents, and the joining of the components into assemblies are only additional steps in the continuum. The distribution of completed assemblies, their erection in the field, and their maintenance once they are in place, all are part of the design strategy. Design decisions are being made either consciously or by a force of convention all along the way. The architect who normally can only select assemblies from Sweets Catalogue and arrange them in a more or less satisfactory manner has no control and little contribution to make to those design decisions which have preceded his involvement. The result is a lack of systems character or systems coordination. Is it any wonder that after five thousand years of building technology, our buildings still leak?

There are two important concepts included in the word systems, each of which could mean the displacement of present concepts of managing the building process and of technological needs. The first concept involves a way of looking at the hardware requirements of a system. Mr. Mader talked about those before. It means that one needs to be aware of the interrelationship and interdependence of the many parts which make up a system. A single building is seldom a system in the largest meaning of the word. It is a component of a larger system which is the city. I would suggest that we might view the city system as consisting of four subsystems. One, the space enclosure subsystem which includes buildings but also ball parks, plazas and playgrounds. Two, the movement system. I mean by this not only roads, subways, etc., but also elevators, stairways for vertical movement, and even conveyor belts. Three, the metabolic system of the city which consumes each day huge quantities of food, fuel supplies, even people, and produces waste in the form of garbage, air pollution, water pollution and graveyards. Four, the information and communication subsystem, the nervous system of the city which keeps its many parts in touch and which makes it possible to be used or to be managed. (And Boston's information and communications system is abysmal. I couldn't find the name of the street I was on tonight when I got to Newbury Street because the sign only indicated the perpendicular street. When I drove in from the airport this morning in a cab, there were signs which said "this way to Back Bay." That's fine if you know what Back Bay is. It's not a bit of help if I'm looking for the Statler Hotel.)

It's obvious that a systems view of a city which makes a single building only a component and normally a minor component of one subsystem precludes any pretensions to grandeur on the part of the designer of that component. The designer and producer of a transistor, a small element that fits in a computer, can be proud of his work. But its utility requires that it work well with all the other parts of the computer. The designer of the transistor does not claim to be the team leader for the Apollo Project. No one really needs to pretend to the leadership of this kind of project. It is a genuine team effort with a dependence of all subsystems producers on one another.

The second systems concepts of importance are the methodologies for management. Management here makes little sense if one thinks of it as boss and workers or leaders and followers. The management process is much too complex. The methodology depends for its power, for its workability, on the computer. The computer becomes the tool for communicating decisions and schedules between the many contributors to the system. The computer becomes the tool for doing the highly complex computations required. The computer makes it possible for a man to

say "all systems are go" at the time of liftoff at Cape Kennedy. We have no way of knowing presently that all of our subsystems in a city are "go" or that the process which is producing the city can "go" adequately. We will need to be certain of these answers in the years which round out this century.

In conclusion, the opportunities which exist and the forces which will shape the use of science and technology in our lives will not likely tolerate architects who limit their skills to one-at-a-time efforts to create occasional jewels. This should imply a concern for all professionals who will still be practicing in 1980. If the systems concept is indeed displacing more conventional ways of organizing the building process, we may be creating a void of competent systems designers who have any aesthetic satisfaction. Someone will fill the void if it exists. Education, therefore, will need to be complete throughout the profession and it will have to be diverse. We will need designers who operate at various levels of skill at many different places in the process of building. No uniform professional training will be adequate if it addresses itself to proliferation of craftsmanship alone. We will need men whose minds have been trained to conceptualize strategies and to simulate design solutions but their areas of concentration will evolve out of their context. Whether or not they will be called architects remains to be seen. We will need to educate men who are capable of dealing with all aspects of this spectrum and with one another. If we are able and willing, the balance of this century can be an opportunity for building the physical realizations of a great society. Thank you. APPLAUSE.

ARTHUR TROTTERBERG

Mr. Eberhard has reminded us that Boston is an informational catastrophe but here is a man who is going to provide us with some new street signs, Mr. Edward Logue, Director of the Boston Redevelopment Authority.

EDWARD LOGUE

Mr. Chairman, fellow panelists, ladies and gentlemen, if only we were doing street signs, life would be ever so much quieter. Before I get on to what I have to say on my own account I would like to take small issue with my two distinguished predecessors. That may be a little unfair but I think their opportunity will come. I for one have limited faith in computers. I have limited faith in systems as a way of rebuilding cities. The very primitive system that we used in urban renewal for rebuilding cities was the bulldozer and we quickly found that by and large it did not work. I make no claim this evening to being an authority on cities but I have looked at them whenever and wherever I could and it seems to me quite clear that very seldom in the history of the human race has a city been well done when it has been done all at once. And certainly in the contemporary examples, whether they be the British new towns or the new towns of Brasilia or Shandigar, there is something inhuman about them, and if I may dare to say so, something a little boring about them. So I think we need the opportunity for variety, for judgement, and the right to make some mistakes. But not quite so many mistakes as the untutored majority in too many real estate developments would permit, and indeed insist upon by writing architecture and aesthetics out when the first cost problem shows up.

I would like to congratulate the Boston Architectural Center for this building, for the method chosen to select a design and I'd like to congratulate the architects for what I think is a magnificent

piece of work. I think we need more buildings like this in Boston. I think you will have a very desirable impact on all of the businessmen who must pass nearby.

Of all the forces shaping the role of the architect one of the most significant is government. I think this has nearly always been so. I think the profession does not adequately understand it although it complains about it so much. We're accustomed to thinking of forces being exercised positively and with some conscious effort. It seems to me the most important forces of government that operate on architecture are unconscious. There is no deliberate intent in the FHA's rather dreary regulations to create drabness. The FHA isn't against beauty. It just happens that way. In public housing, clearly the United States of America, the President, and the Congresses of the United States have never decided that the poor must almost invariably be housed in ugly buildings but it works out that way. The last thing that the designers of the Federal Income Tax intended in the 1930's was that the corporate income tax and the personal income tax and the concept of depreciation and double depreciation should militate in favor of ugliness and against good design. But that's the way it works out.

Then we come to the Federal Government as client. There's something terribly ironic but terribly sad in the fact that our government's first conscious effort in more than a hundred years to achieve good design was in the Foreign Buildings Operation of the Department of State, safely tucked away in foreign countries. Only recently have we begun to see some sensitivity on the part of the Federal Government about design here where we can enjoy it ourselves. I've seen more attractive American buildings abroad built by our government than I have in our own country.

We come to the State and this might be a good week to have a moratorium on any comments about the State. But there are other things beside the State as client. There are state laws, bidding, filed sub-bidding, and all the things which so regulate and restrict and constrict the work of the architect that we wonder if it was intended that the State have an adverse effect on design. Some of the most beautiful human settlements that I have ever seen or ever heard about or ever studied are the New England towns. But here in Massachusetts we haven't repeated much of that recently.

At the local level of government, the city bureaucracy, there are very few architects who consider the Building Department their warm friends, who are prepared to say that they get a friendly welcome for any new idea. The architects find in a city government very little evidence of concern for design and on the whole the city as client is not to be distinguished from the State or federal governments.

Now we can have a discussion that will lead us nowhere about whose fault this is. Is it the fault of civic leaders, political leaders? Perhaps. Real estate interests who don't really understand design and too often really don't care about it? Is it the fault of the universities? How many universities in this Athens of America, as we so frequently hear ourselves called, teach their non-architectural students to become aware of good design? Surely the profession of architecture must take some of this blame, and I fault you there because speaking to you as an audience of architects and friends and wives of architects, I regard you as a very silent profession. If you think back on how seldom you have spoken out on the issues now claiming so much newspaper

attention you will see that some of the responsibility for the fact that the community finds itself unprepared for this discussion surely lies with the architectural profession. Happily we are beginning to be aware that something must be done.

I remember a discussion I once had with a gentleman who was the Urban Renewal Commissioner and one of the things he said was "Design is none of your business." That's changed. And in FHA they are even beginning to make design awards. Whether you as architects would make the same awards is another matter. We are gradually beginning to see the Federal Government caught up in the urban renewal process because the important federal buildings are by and large built in cities and the General Services Administration which has a pretty good eye for a bargain has discovered the "write down." So gradually the Federal Government is getting more and more sensitive to this. At the state level I think the prospects are improving and whatever difficulty may be caused by the current controversy, it seems to me inevitable that the end result will be a more effective public concern. If you care, ladies and gentlemen, and you care enough, 90% of the problem is solved.

At the city level it seems to me we have great opportunity for progress. Here in Boston, at long last, we are proposing a reorganization of our whole public building program so that it will not be quite as complicated with quite so many different sources of authority. I think if we can get this legislation adopted by the general court, you will see a level and pace of public building here that we can all be proud of. As clients I think cities generally are beginning to improve although we would all acknowledge that we have a long way to go. We have a long way to go, for example, in tax policy and assessment policy to getting away from the implications of the Seagram decision in New York. Beauty does cost more, let's be honest about it. Let's not penalize the developer who cares enough to provide it.

It seems to me, and I suppose this will surprise no one, that the most effective single instrument for shaping the role of the architect in government in a more effective way is urban renewal. And I will take just a moment to say that in the BRA today every single public building, whatever the level of government, and every single private building, is reviewed from the standpoint of design and the planning objectives of the approved urban renewal plan. It's a careful process, sometimes too time-consuming. I think it has given us on the whole a high level of design. If you were to say, as I sometimes say to myself that Government Center is such a varied collection, I can only say that that is the state of your profession today. You do not all do the same kind of buildings and you don't even all agree on what a good building is and what a bad building is.

Now the urban renewal process can do more than any other thing on the horizon today to make it possible for the architect to do a better job in rebuilding our cities. Behind all of this, of course, and the mention of the systems approach to the space shot reminded me of it, is the whole basic question of resource allocation. Architects and slum dwellers alike are being deprived of opportunities because national resource allocation decisions have been made that we have to do things in Southeast Asia and on the moon first. That's less work for you and longer life in bad housing for a lot of poor people.

It seems to me that we are headed for a great expansion in architectural work, public and private, that there is a great oppor-

tunity for your profession to involve itself more effectively than it has in these decisions. I would like to suggest most respectfully that it is time that it became a matter of prestige, a matter of honor, for an architect to serve a brief tour of duty in the public service. There is lots wrong with my profession of law but we understand and respect the members of our profession who go into public service and I would guess that we'd have a great deal of trouble naming ten members of the architectural profession who have served a stint of public service. And I even find, to be terribly frank, that our very good design review people in the BRA are looked down upon by some distinguished architects who ask if they are really any good as architects, why aren't they at the boards. All I can say is that I would rather have Charlie Hilgenhurst and Steven Diamond and all these other people doing this work than try to do it myself and I think you would too. I think you need to honor these public servants, these few public servants among you and increase their number.

Finally it seems to me possible that whether it takes a doubling of your dues or something else that you should become a more visible, a more vocal, a more effective force in the arena of public debate. I hope that in years to come your voice will be heard in shaping the futures of some of those public servants elective and otherwise who now have perhaps too much to say about your role in society. Thank you. APPLAUSE.

ARTHUR TROTTERBERG

Our next speaker may not be one of the forces that shape the architect but he is very definitely a force who, to a large degree, shapes the architectural solution. Mr. Gerald W. Blakeley, President, Cabot, Cabot, and Forbes.

GERALD BLAKELEY

Thank you Mr. Chairman. Ladies and Gentleman. I'm going to talk primarily about two very basic elements of all we've been hearing tonight: cost and beauty. Of all the forces shaping the role of the architect today and determining whether he is going to be a vital force in the future, I think the majority stem from these two.

First, let's take a look at cost. The little statement on the program, "is it possible that architecture is going to become something just for the rich to indulge in" seems to me ridiculous because there is such a tremendous place in architecture for an architect who totally involves himself in that which he is creating, which is a building. Not merely in the vague dream, the conceptual design, but primarily in the following through and in the construction and the cost of the construction so that he is ready when his next client comes to him and says, "Well, here's my budget and I want something that's good within it, can you meet it?"

One of the most important things is getting architects who have a firm knowledge of cost and can be ingenious within the budget. We've always said at CC and F that probably the man that could build the most beautiful building for us was someone in his first year out of architectural school. He knows none of the inhibitions of cost and he has a pretty good feeling for beauty or he wouldn't have gone into architecture in the first place. And if we wanted a building at the best cost, we wouldn't take an architect at all. In fact, industry across the country, for many industrial buildings and warehouses, hasn't bothered with architects for this very reason. Probably billions of dollars worth of buildings in industry have been designed by engineers because architects didn't con-

cern themselves adequately with cost. So it seems to me that architects, to insure their place in society, have got to become more involved.

Now let's talk for just a minute about beauty. Beauty I think is something which is changing in our affluent society and gradually becoming a commodity to be enjoyed and shared by what we used to call the masses. A hundred years ago the only people that had truly beautiful gardens were the very wealthy. Today beauty is something which the majority of people in this country can afford. Whether it's beauty in the form of a small statue or a painting, whether it's beauty in the place visited on vacation, the raw starkness and nakedness of the New England countryside in the winter, beauty is something which the people can now afford and must be incorporated in our cities.

Now one of the reasons for the systems that my predecessors on the panel have talked about is that possibly in bringing together great systems we can cut much of the inefficiencies which have formerly gone into building. I still shudder when I see a building being built today with antiquated methods—until just a few years ago, you had to have hodcarriers carry your bricks and your mortar up on the platform. Finally now in Boston you can use cranes to haul it—but our entire technique is antiquated. So we've got to develop systems for producing things cheaper.

Buildings are going to become part of greater systems which will be cities. And the question arises, who is going to shape the truly great city? Is a building just going to be plugged into a system which is a city and is a city going to be designed by an architect? We argued about this a little beforehand and Ed Logue said he thought lawyers were going to be shaping the cities of the future. I quite seriously think that bankers and investment bankers and developers on a scale which we've never known will do the shaping. Many of you probably know that Westinghouse has gone into the real estate development business. They've acquired in the last several months Corral Ridge Properties in Fort Lauderdale, Florida, which owns property in Florida and in the Carribean Islands. They've bought a staff which is highly oriented in the sales field. And of course when you look back in architecture, some of the greatest architects have been great salesmen and I think some of the great ones today are certainly great salesmen.

In the development business, in the real estate business, we operate for profit, but we see more and more that in our desire of fifteen years ago to meet industry's demand for cost, we came up with some buildings which ignored beauty. Now that fifteen year leases and ten year leases are coming up for renewal we find that perhaps the more attractive buildings are the ones that in the long run are going to command the better price. We've known for many years in real estate that there were three prime things in the building of a building. The first was location. The second was location. And the third was location. We see now that in order to stabilize locations beauty can do a great deal. We started industrial parks a few years ago and set a building back fifty feet from the street, and then courageously moved it back seventy-five feet and now in San Francisco they're trying to get it back a hundred feet. Industry fought us every inch of the way and I remember one very large tire company called me from Akron just after we had completed the lease and sent it out and said, "We've signed a twenty year lease and do you realize this is a four and a half million dollar commitment over the period

of the lease? By the way, I've blocked out one very minor paragraph which has a lot of folderol about no paved parking in the front of the building. Now all this business of shrubs and grass, you aren't going to be able to cram that down our throats but I'm signing the lease and we'll put it in the mail this afternoon." Well, after many weeks of negotiation in Akron the lease was finally signed with no paved parking lots in the front and with shrubs and grass. It's been very rewarding to see that this same company has built several buildings in other parts of the country with grass and shrubs and they've even outstripped us and planted bigger trees and more shrubs.

So back again to cost and beauty. These two things, simple as they sound are two of the most sophisticated problems for an architect to cope with. Colleges can afford architectural experiments which we in industry can't. They can do buildings in the spirit of experimentation. We have to do things for the public's acceptance, whether it's an apartment house, an office building, a hotel, or an industrial plant. Just bear this in mind. Many of the buildings that architects have liked best our clients have liked least. And many of the buildings that our clients have liked best, architects have liked least. In the future I think economics are going to shape the form of our cities. I think our cities are going to be planned more than ever by sociologists, working with economists, working with developers, and the developers are going to be the large major corporations who are going into real estate. How well an architect can resolve these two very simple elements, cost and beauty, will determine the place of the architect. Thanks. APPLAUSE.

ARTHUR TROTTEBERG

We're going to turn the floor open to questions in just a minute but before we do, we would like to see whether among members of the panel themselves we have some internal questions or comments any of the panelists would like to ask each other.

QUESTIONS FROM THE PANEL

EBERHARD TO ED LOGUE. Let me try to repeat what I think you said. You said if we really care, and we includes the architect, then those government bureaucrats who are either elected or appointed to office will have less reason to tell the architects what they ought to do. Is that correct?

LOGUE. No, no this is a purely local reference and a problem which has been with us for a few days.

EBERHARD. Oh, I see.

LOGUE. It may really have been with us for a few years but it has just sort of surfaced. I do not believe there is any one system which can be used which will guarantee quality in the selection of architects for public work. What I'm saying is that the decision needs to be made that you care for quality, that you have an effective concern for design and once you do that, it seems to me 90% of the difficulty is solved. I shall never forget going on a tour of New Haven with the late Adlai Stevenson, a distinguished, educated, cultured man whose idea of a good-looking building in New Haven was a fake Georgian power company. It seems to me that this is true of the average president of a university or the average president of a significant corporation; they don't know good from bad and don't even know that they're supposed to care. And a system, whether it be competitions or panels, is not going to make any difference. You have to care.

BLAKELEY. I'd like to address a question to Mr. Logue. Although I think the world of him, I disagree with him quite violently on some of our architectural differences. We designed a very traditional building to go next to the Ritz Carlton to tie in with what we thought made Boston different from Cleveland, Atlanta, Georgia, Miami, and Los Angeles. We used red brick and brown-stone trim and we went to a tremendous expense and were willing to spend a lot of money to do a peaked roof. It was to be a green copper roof and we had quite an argument. I think that in a city which is distinctive, we should try to capture a little character to bring a little of what has been attractive in Boston in the past into the new Boston. If the new Boston is just going to become the kind of place that makes you wonder 'am I in Cleveland or in Miami' this is tragic.

LOGUE. It seems to me that the Edward Barnes Gerry Blakeley Merchants Bank Building on State Street is going to be a good Boston building.

BLAKELEY. Yes, because we're using granite rather than cast stone. But tell them about the apartment house, Ed.

LOGUE. I'm coming to that quickly. I think the fact that it is in the Urban Renewal Project area and therefore under the ordinance adopted by the City Council the BRA has to have a design review over your proposed apartment building, will help insure that it will be a beautiful building. But I think you have made, and I credit you for it, the fundamental decision about whether it is going to be a good building or not. You've hired an absolutely first-rate architect and you'll get a very good building on Bowdoin Street which has a church on the ground floor. They got away with that while you folks were all asleep. And I don't know whether the architect who did that monstrosity is in the room or not and I don't care. I think he owes an apology to the city of Boston for a good long time to come.

Did he have to be reviewed by the Director of Planning of the City of Boston?

LOGUE. No, and if he did, that building would never have been built.

Why wasn't he subject to review?

LOGUE. Because he could fit within these crazy outmoded things and he's just across the street from the Beacon Hill Historic district and my friends who care about Beacon Hill were asleep. They didn't see this development opportunity and they didn't take it across Bowdoin Street.

EBERHARD. I have a question for Mr. Blakeley. You mentioned in your talk that beauty and economy are either mutually exclusive or a formula of such subtle complications that a solution really lies in the future. Do you mean to say that with all your new systems technology and compartmentalization and prefabricated components and so on that this is in fact so far in the future?

BLAKELEY. One of the things which I think I forgot to emphasize is that as modern manufacturing techniques and new modules help to bring cost down, the labor cost in construction is going to be so great that cost is going to become an evermore vital factor. Many of the things going into beauty are very expensive. In this building Ed says he likes so much, this forty storey office building that our architect Ed Barnes in New York is doing, we

weren't satisfied with cast stone. We think cast stone is going to be one of the raw things of the 1950's that's going to be outdated very shortly. We went back to good old fashioned granite but the cost was so fantastic we had to go through a very elaborate process of getting thin slabs of granite on a concrete sandwich. There again having to take advantage of all the cost techniques but still costs are going up faster so that the melding of the two constantly gets out of hand.

I don't know why you wanted to use all that marble.

BLAKELEY. That granite. Well, one of the quiet preferences we have in Boston is for masonry buildings.

The floor is yours. We'll try to adhere to the general subject, to the forces that shape the architect. Controversial issues are not barred but hopefully they'll fit within some semblance of the context of what we're talking about.

QUESTIONS FROM THE FLOOR—

I'd like to address a question to Mr. Eberhard. You spoke of organizations such as NASA and their systems development. Could you relate this to the organization of the design profession in the future? If we come to the situation such as Mr. Blakeley spoke of where large corporations involve themselves in development, will we make correspondingly large government organizations to exercise design control?

EBERHARD. Let me try to repeat the basic argument once more. I'm not talking about government organizations which will implement systems. I'm not talking about large organizations as such. I'm talking about a concept. Once the concept of all men being equal and capable of having equal opportunity became alive in the world, it became a force which has moved on inevitably and is still moving on and there have been adaptations to it in various ways during the last three or four hundred years. That concept was of sufficient power to form the United States of America. What will happen over history will evolve within the context of the concept.

My argument is that the concept of large scale systems approach in which one has an awareness, not of pieces of hardware, Ed, which is how I think you understood me, but of the interrelationship of all of the pieces that go to make up any entity whether it's a city or a building. One also talks about the concept of how to manage large scale enterprises in a systems way. These two concepts I see as inevitably moving forward in the building industry. That means it is likely that some of these kinds of things will happen and that there will be large government organizations. There already are. I think there will also be the rise of large intelligent customers. This includes corporate customers, like IBM and General Motors.

Now the role of the designer, therefore, will be varied. There ought to be designers of the strategy which is involved in this system. There ought to be designers of the total process of how one goes about producing, converting raw materials into finished goods. Those kinds of people would be master designers. And then there could be all kinds of designers beyond that. There could be the architect in the conventional sense who sits down with the clients, helps him identify his need, translates those needs into requirements which are brought to the building process and which are ultimately completed in the form of a building or a city. But the way that he records the concept, the

way that the concept is transmitted to the production process, and the organization of the production process itself will change. And if these young men who are now in universities and expect to be professionals twenty years from now are not capable of dealing with that kind of change they are going to be relatively useless.

I'm not sure if I understood your concept and I think I agree with it. Could you suggest, since you talked about a teamwork approach, who might be the generals?

EBERHARD. That doesn't worry me. I think if we educate people who understand general concepts, such as good design as an intellectual activity, and not just how to design good staircases, if we educate people who are capable of understanding the management of complex concepts those who are excellent will rise to the top.

Don't you think perhaps that the education of the architect already prepares him for this kind of role?

EBERHARD. No, I'm sorry. I think architects are beautiful people. They care. I think they have a chance to learn to live with this system. But there are all the signs and indications that they won't get a chance to care. I'd like to submit that if we do have this systems series and systems of systems, we're still going to have meetings like this in which we invent a system to find out whether the system that is working is automatically rejecting good design because it is outmoded or whether this system needs to be redesigned so that it can allow for a 5% per year increase of good design standards along with the gross national product. The whole problem is that there is quite apt to be a large number of people making these decisions, who are observing and finding out exactly whether human beings are being served by what the products of these systems are. And I think you're right that the architectural student of today and hopefully some of us old-timers still have to make basic value judgements. You're not lost as individuals. Unfortunately, I'm talking about the profession which Mr. Ketchum is the president of at the moment as it presently defines its role.

KETCHUM. Our profession is not afraid of the new tools of architecture. We are sinking a lot of money, and a lot of time and a lot of enthusiasm in investigating the future of architectural education. Architecture today is teamwork and that teamwork includes technology, but I've yet to see a city designed by a computer, or a school, or a church. I've yet to learn that architecture is simply cosmetics applied to the exterior of some structure. Architecture is the formation of space indoors and out with buildings for the spaces around them, for the cities that buildings make up. It's certainly not the cosmetics that have been discussed by some of you or the techniques that we are not afraid of. **APPLAUSE.**

Architecture has been asked by some psychiatrists to prepare a design for the mentally ill. Maybe we will arrive at a solution capable of accommodating the mentally well. Perkins was designed not for the masses but for the bodies of people and how they use their bodies. Now I'd like to know how the systems approach and the industrial module fits in with this concept.

EBERHARD. Let me see if I understand the question. The question has to do with the concern for the mentally ill and the design of facilities which reflect the concern in order to provide them

with facilities which will help them with their problem. Is that the context?

Well, I'll state it again. What is designed for the mentally ill and studied perhaps can be used to arrive at a solution capable of handling the mentally well.

EBERHARD. Well let me try to answer in this way. First of all, everything I talked about is a tool. And all I'm trying to advocate is the use of the tool. I'm not suggesting that this tool can substitute for human emotions, for human judgement or for understanding. But it can strengthen. It can extend. And it can make better related the work that we as architects are capable of doing. There's another dimension which I think your question addresses itself to. We're about at the end of the fair-haired days of the physical scientist and at a point now where the life sciences are on the rise. This means that we are going to learn to know more about man, what man means to his environment, how he's related to his environment, and we will do so beyond intuition. We will do so on the basis of reasonably scientific data. I suspect your quotation refers to a study of the mentally ill as one way of taking a scientific approach to this problem. Because we will know better how man relates to his environment, what the usual requirements are of people when they use buildings. I think we will have all the better way of using tools like the systems approach and computer analysis because these will add to the complexity of the variables with which we will have to make decisions.

TROTTEBERG. I'll add one thing to that, John. One of the common treatments of the mentally ill has to do with things grossly simple and grossly beautiful. These are two of the factors that are used to put them back on to the path gradually. This may be a key to the architectural needs.

I'd like to ask Mr. Logue about the staff architects he mentioned briefly and their status. Are these practicing architects?

LOGUE. Well this works out surprisingly well. In the BRA we have a registered architect named Hilgenhurst, and he's the Director of Design Review. He has a staff of people who work for him. Then we have a group of volunteers. I think the chairman currently is Hugh Stebbins and associated with him are Nelson Aldrich and Lawrence Anderson and Pietro Belluschi and Jose Luis Cert. They don't get paid for what is a great public service and we ought to figure out some way to honor them more than we have. For special occasions and for special projects we usually have one of them and two other distinguished practitioners who may not be from anywhere around Boston to make selections and I think the profession as a whole has warmly supported this concern for good design. You would have to question the members of the profession who are in this room who practice in Boston and the Boston area about whether they welcome it. I think there is some evidence, to me at least, that they do.

BLAKELEY. Could I speak to this? I think controversy makes every situation a lot healthier. And I think all of you would admit that architecture is a matter mostly of personal opinion. Many of you have your wives here tonight and many of you think your wife is beautiful and how many of the other wives in the room do you also think might be? Architecture is the same. Now in this business of this review board, you pit one opinion against another. I think that the life insurance companies and the large

pension trusts are one of the very leavening forces in architecture today. They're insisting on better architecture. They've been guilty of financing for some pretty bad stuff and particularly in the apartment house field in St. Louis and Los Angeles, where apartments have been so disastrously overbuilt. It's the badly done ones that are suffering most so I think the people most conscious are the bankers. Some of the junk that's been built along the Charles River in the last few years is highly a matter of opinion. Now when you pit an architect who likes that against someone of equal stature who doesn't, here again it's a matter of opinion. What I'm pointing out is, not that this review system doesn't work. I'm just pointing out that I'm a private developer and I'm speaking for the other side of the coin and it has its imperfections.

LOGUE. Let's admit quite quickly and clearly that it has its imperfections. And if the architects present here will forgive me, we have a saving grace in that we have a layman who can decide, because I do remember—if I may tell a small story—a glorious project called the Waterfront Project which is outside Boston. Anybody who knows the BRA, they all think that Waterfront is their favorite project. Yo-ming Pe had the commission to make the overall plan for that part of Boston and specifically the Government Center. But he couldn't resist the Boston waterfront so he made a quite detailed plan. And then we invited the Greater Boston Chamber of Commerce to make the plan for the next stage and they engaged different architects, very talented architects, who of course came up with a very different plan. And I in my innocence asked David Crane, who is an architect and a former head of the Planning Department in the BRA, to resolve this dispute and of course every architect in the room will know the result. We got a Crane plan. There does have to be some give and take and on the whole I think it's a credit to the profession that it has worked out as well as it has. But it has cost, let's say, a little bit more. But if it is understood, ladies and gentlemen, that quality is going to be built in and not the first thing that's knocked out, this may have an effect on the price of the real estate and maybe people won't overpay for real estate and then try to take it out of the design.

May I ask again about the role of the citizen in the field of architecture? Could you comment on whether or not a non-architect has a role in the review of architectural projects in terms of economy, in terms of true value for the community and other terms? Is there room for BRA review boards for non-architects?

LOGUE. The answer is yes. I'm the administrator of the BRA and I make the recommendations to the authority and I'm a lawyer, not an architect, and I try to have some kind of judgement, good or bad, and my board are all non-architects and they try to form a judgement. And in effect laymen make the final decision on the public side. Now I think that's the way it ought to be.

I think that Mr. Blakeley has made remarks about beauty being a matter of personal opinion. The role of the architects in the Design Review Board, I think, is distinguished by the fact that those who are on it are capable of explaining the anatomy of their opinion, are able to make it clear to those whose prejudices are not already highly developed, exactly what they feel about a building and why they think it is good or bad. I just hope that our design review board and our attitude toward design review

will always involve the employment of architects who understand that beauty is the result of a process and the result of understanding and the result of experience and can make this clear to others.

BLAKELEY. I think it's important though that group of architects be large enough to represent a great many of these opinions in architecture. If you have two architects, one architect deciding, it's very much a matter of opinion. Two it's less. Three it's less. And four or five, then they explain the anatomy of the thing and begin to see understanding and then you can see ideas changing. I think as long as this is a large group and as long as the BRA architectural review board continues to keep people of the quality it has now then I think it will be very effective. If it ever degenerates into just one or two, then it's going to be very bad.

LOGUE. Let me say only one short thing about laymen understanding architecture. Margaret Mead indicates that in Indian civilizations, which obviously are much simpler than ours, everyone participates in some sort of artistic activity. Those who are the most excellent are recognized by everyone in the Indian community. And they are selected for the top jobs. They paint the doors on the temple and those works which need the most excellent work. It is not necessary for them to explain to the rest of the community why their work is excellent. **APPLAUSE.**

TROTTEBERG. We have time for one more question. And it must be a question.

I address myself specifically to Mr. Eberhard. I would like him to indicate how the concept of system can be made to become self-corrective.

EBERHARD. That's a tall order. You are in a sense asking me to design the future building industry. My implication is that the concept of a system which is manageable—I don't mean that any one person has to manage it, but which is manageable in the sense that its parts are well related—is capable of self-improvement. The closest example I know of is what Ezra Ehrenkrantz has done. This is to organize the client as an intelligent customer of systems producers in a way in which it is not prescribed from the beginning what it is that one would do but the users' needs and performance language are stated. The producers which are a part of this system then have an opportunity to invent and innovate against these performance requirements. They are evaluated against those performance requirements. Those physical systems are then incorporated in the building systems which become a part of the educational systems. There is a beginning there. My thesis which I keep using over and over again, more forcibly in other places, is that the computer offers the tools for doing this. The computer is a language. If none of us were able to speak Swedish and I were to come in the room and speak Swedish to you, we obviously would have no communication. The computer is a language in the sense that Swedish is a language. When we all begin to talk to each other in computer language, then I think there will be a language in which the production process in the factory, the erection process in the field, the design process in the architect's office, the engineering process in the engineer's office, all will have ways of linking themselves to one another that are less tenuous than they now are. This kind of system then will be capable of self-improvement. I can't map how it will work exactly. I have faith that it will happen, just as I would have had faith in the Emancipation Proclamation once Mr. Lincoln offered it. **APPLAUSE.**



JAMES J. CONNOR

EDUCATION OF THE ARCHITECT

SEMINAR TWO

INTRODUCTION ARCANGELO CASCIERI

Welcome to the Boston Architectural Center seminar on the Education of the Architect. After listening to last night's discussion, one realizes that it is almost an impossible task to train an architect. The ever-changing process of architectural education is going through a turbulent period. It is faced with great challenges and demands created by the needs of the 20th century man who lives in a complex world of tremendous environmental changes. This computer conscious world taxes man's imaginative and educational powers with its growing demands and requirements.

Architectural education is no longer confined to aesthetics and technical studies. It must spread its base to include the social, economic and political sciences. It must deal more deeply with the complicated structures and mechanical equipment which have added to the complexity of our buildings. Education is chal-

lenged by the 20th century juggernaut whose space requirement is destroying thousands of acres of nature's handiwork and even eating into the hearts of cities like a cancerous growth. Teaching is faced with the problem of training men who will be well equipped to solve the major problems of the century.

Research on education is nation-wide and there are many attempts to discover better tools and methods of communication. The Center too is involved in the research and is restudying its curriculum. Here the educational program is based upon a dual approach of apprenticeship during the day and academic study in the evening. The effectiveness of this method is in part due to the fact that it brings the student in contact with the practical aspects of architecture in the early period of his training. This, although it is one of the oldest, is still an important method of educating the architect.

The Boston Architectural Center is fortunate and is honored to have such a distinguished panel to discuss this timely subject, the Education of the Architect. It is also fortunate in having as the chairman a person who has had great experience in dealing with the complex problems of architecture and urban design of the 20th century as an educator, practicing architect and city planner, who came to the University of Pennsylvania in 1951 as Dean of the Graduate School of Fine Arts and added to the architectural program a new department of Land and City Planning. It is a pleasure to introduce to you Dean Holmes Perkins, Chancellor of the College of Fellows of the American Institute of Architects.

G. HOLMES PERKINS, Chairman

Thank you very much. It would be improper to begin our talk today without telling you how much we admire the energy, the drive and the great dedication which has resulted in the continuation of a great institution, the Club, and now the Center. It is perhaps the only survivor of a great tradition of Victorian times for the education of the architect. And I think at the same time it is perhaps a symbol as to how we might be able to enrich the education of the Architect in the future, because it is a symbol of the contact between the profession and the schools, an absolutely essential team which must carry on in the future. We have had a cleavage for many, many years and I hope the split is being healed.

When we speak of architectural education we have a tendency to bewail the times and talk about the beauties of the past and the great traditions of our forbears. And I must say as I came up in a train last night I was asking myself what had happened to the paneling in your library on Somerset Street. And I was delighted to see in the first room I walked into the paneling back in place again. That continuation of the tradition is a magnificent thing. Therefore, I am somewhat less prone than some to bewail the past and bewail the present. I think we have a dynamic society and are going to produce an even better one and an architecture which is worthy of the great aspirations we have for society today.

That doesn't mean we should be satisfied with what we have. We sometimes have a tendency to compare ourselves with the physicians because they got at the reform business somewhat earlier than we did. And Osler around 1900 began to revolutionize the teaching of medicine along with Flexner and others. I would like to just mention this because I'm afraid we may fall into a trap

and not see the woods for the trees. In 1900 scientific medicine became the objective of the profession, specialization became the dominant pattern of teaching, and the university medical center became the preferred instrument of the profession. It sounds curiously like some of the proposals in architectural education today. But twenty-five years later the medical profession began to examine the premises of their earlier education. And this concept of scientific medicine began to be supplanted by a new concept of comprehensive medicine with an interest in the whole man: with an interest in his emotional as well as his physical well-being, and in his home and his environment. I would suggest to you that we would do well to learn from this experience in medicine, that we must be concerned with the whole man, with the whole of society, with home and the community environment. And I see no reason why we should limit ourselves to purely the scientific view of architecture and of the architect's responsibility.

We have here on the panel a number of individuals who can speak to this far better than I can. I like to think that they can do this because they are all younger. Unfortunately there are two members of the panel that are not able to be with us today. Geddes, the new Dean at Princeton is, happily I suppose for him, enjoying himself abroad. Charles Moore unfortunately became ill yesterday and is unable to be with us. Mr. Spring will be chairing the Seminar this afternoon. Our first speaker this morning will be Romaldo Giurgola. Giurgola is a Roman architect, a modern Roman architect, and he is now the head of the school at Columbia and I for one am very sorry that he is, because we have enjoyed his company at Pennsylvania for a great number of years. He is really one of the finest architectural designers that I've ever had the pleasure to know. He is sensitive, human, and the true humanistic spirit pervades all of his work. You are all aware that he was the winner of the competition for the headquarters of the A.I.A., which we trust will shortly be built on a somewhat enlarged version of the original design. It's a great pleasure to introduce Mr. Giurgola. APPLAUSE.

ROMALDO GIURGOLA

Dean Perkins, ladies and gentlemen, we cannot reasonably talk of a crisis in architectural education without first agreeing on its meaning. We have come almost unconsciously to an historical development and we are not critically prepared to be here. The crisis in architecture comes at a time when a new town for 50,000 people is needed in the world every seven hours. And the crisis in education comes just as utopias become realities. It is not sufficient however to assert that there is such a crisis or that architecture, like any other human activity, no longer has reference to a fixed system, to an institutionalized system of knowledge which was the foundation of the classic culture. As architects and critics, we must labor to comprehend our crisis which is only one part of a sort of global crisis of consciousness. The forecast of deep change, the transformation of utopias into immediate realities, a dialectic which denies the functioning of the past in the present, all will have deeper roots than those which produced the industrial revolution.

For us as architects the single relevant fact is that man no longer bases his ideas of space and time on nature, with its seasonal cycles and forms. He bases them today, as Gropius prophesized, on society and the dynamic of its internal relationships. This is the real mutation of human behavior: from contemplation and a

presentation with nature as the model, to action which works on the social reality and modifies it. As a consequence, a major consequence, our objectives have changed because our designation of values and our choices have changed. In the 16th century a palace could be erected at the sacrifice of houses for the poor. And, because of shared values and aspiration, it could still be thought a masterpiece, still be a masterpiece. Today the so-called historical active area is not that of the individual as a symbol of society but that of the community. And there we may find our aesthetic values too.

There is nothing surprising about the fact that this notion of space and time should have switched so suddenly from nature to society. What remains to be seen is whether man will maintain the same attitude that he assumed before nature. This seems to me a critical question for an educator, an architectural educator in particular. Society is not a stable and immutable entity as is nature. It changes continuously and can be changed by anyone. Similarly the relations among people are those of interaction and of common interest. One does not contemplate society. Under these circumstances architecture is more complex. The architect must deal with a fluid entity and a great quantity of unknown factors which when known are obscurely related or not related at all. Yet never before has man felt so great a need for planning, for programming, in short for those instruments which should guarantee a rational choice for the individual and the society. The existence of this opportunity for choice depends on those of us who make the environment. The alternative, however perfectly programmed, however highly technological, is an obscure future, an obscure destiny. It is the difference between life and mere survival.

Learning is divided fundamentally in two spheres of interest, one concerned with growth, the other concerned with environment. Architecture draws its substance from both, and as an intellectual order manifested in form embodies the advancement of knowledge. That is the best definition that I could give nowadays of architecture. Thus architecture is an art expressed in reasoned spaces and, like all art, it becomes a guide to social and technological changes. To study architecture is to learn how to translate life into form which in turn affects life in an enduring cycle.

Since our designation of values has changed, we must now comprehend the phenomena in the events which constitute today's realities. If we do not, all technical knowledge is insignificant and worthless. This is what makes architects different from engineers and what makes the training unique. I suspect at this point that the models of architectural education are more often to be found in the humanities than in the sciences and technology although architecture encompasses them all. Knowledge is a word used quite often today and it seems to me dangerous to confuse the advance of knowledge with the growing complexity of intellectual organization. And dangerous too to promote private preoccupations to the rank of philosophical problems upon which our teaching is based. Our objective as architectural educators must be the understanding of architecture in itself, not only as a reflection of the individual.

For a long time our schools have developed in a sort of pseudo-empirical atmosphere. Many signs now indicate that this time has come to a close and the essential qualifications that a school

should develop in a student have indeed changed. Fundamentally these qualifications are the will to take an active role in the making of the environment, with an understanding of the needs and beliefs of the individual and the society. The so-called civil service says architects today should have the ability to make decisions, to comprehend all creative expression, to develop a sense of inspiration from nature, and to understand the present as a part of an historical process. These aims are achieved through the acquisition of knowledge, skill, and, most important, a sense of critical judgement. The problem in architecture is always the same: the relation between reason and sense perception. And the goal is also the same, a sort of super-rationalism in which sense perception is integrated into reason with no compromise of either.

The real aim of architectural education today should be to develop in the student, through this integration of reason and perception, a maturity of critical evaluation. This is essential if the architect is to become once again a leader in the project. And by "project" I mean the complex operation which brings into contact the instantly related events of today which are rooted in different regions of experience, and through which mutual functions are realized in a structure of relationships eventually made explicit through form.

Architecture in the past was essentially effected by the art production relationship manifested through craftsmanship, struggle with material, detailing and so forth. Today, architecture cannot go back to craftsmanship because the artisan has almost ceased to exist. At the same time, art and architecture cannot adopt or copy the processes of the industry which has taken the place of craftsmanship, because in so doing art becomes an instrument of industry rather than the model for it. This is the reason for the incoherent debate of our time in our man-made environment between the pathetic imitation of craftsmanship and the obstruction of mass production.

A substantial difference exists between the technical process and that of the architectural project. In the planning of an industrial product a certain number of factors are combined and related in order to resolve contradictions, and the result is a reduction rather than a proposal. During this process confrontation, reduction and choices still take place, but always they are envisioning the success of a product or the progress of the technologies which produce it. In this process there is no place for critical evaluation. Take the example of the car. You need it to go faster. You need a bigger engine. Then you change the carburetor and keep going on without ever questioning the presence of the car as an entity. In architecture and in art the critical component on the other hand is always present and active. The very fact that in judging a work we begin by asking if the work is art or non-art proves that we want to make sure immediately if the work gives reality to the very reason for which art exists.

The problem of architectural education is not so much how to extend the acquisition of form-making skill to the early years of college preparation but rather how to make stronger the humanistic and scientific foundation that enables the student to develop a mature sense of evaluation of those changes which continuously affect our social environment. The new generation must learn the art of settling and homesteading in a way that is more difficult than pioneering. What is more important to this genera-

tion, therefore, is intellectual preparation: a broad and exact knowledge of the phenomena in human events, the acquisition of an idea of theoretical principle from which to originate action, a universal technique beyond any particular one. I may recall, in terms of this technique of the mind, what the drawing meant, the perspective and so on in the Renaissance. That is why architectural preparation must focus on the project beginning in the first year as an inspiration of the individual to build, followed later as an inspiration of the society to build. In the studio the work toward the universal principle from which to originate action must be developed and architecture must become a discipline that can be taught in its theoretical and programmatic aspect without fuzzy boundaries between architecture and the other disciplines.

Architecture is not the combination of a certain number of facts related in order to resolve their inner contradictions. Architecture is not the deduction nor a process but an act and a proposal. Therefore the educational process must prepare for this act and cannot begin in making of forms but in the study of the activities of man and a study of the natural law which conditions the forms. I suggest that the study of form be moved in the later years of study where it can be approached with a developed sense of evaluation on the part of any student, substantiated by a more mature thought. This would further remove any misunderstanding on the real nature of the architectural project. It is during the elaboration of the project that architecture really acquires sense and starts to define its limits, its ultimate aesthetic. It is in the project when the exercise of critical evaluation is active and when the mobile structure is realized that architecture finds its reason to be.

Finally, the study of architecture is motivated in a young man by the interest and passion for life, unknown to the strict logic of technical planning, deprived as it is of the critical component. This interest in the entirety of life must be sustained and developed on an intellectual level if it is to become an instrument of leadership. Society asks the architect to find and interpret its events in a system of reciprocal relationship where every element becomes a function of the other, to search in a word for a structure and to give form to that structure with an art expressed in reasoned space. The architect who has the ability to introduce in this project a deep sense of critical evaluation becomes an initiator and a leader, working not merely to crystalize existing situations but to find and express those laws which must precede and determine his choice as an individual if his architecture is to become a reality.

G. HOLMES PERKINS

It's a great pleasure to welcome Charles Burchard of Virginia Polytechnic Institute to the panel to tell us some of his ideas and thoughts on the education of the architect.

CHARLES BURCHARD

Thank you, Holmes. I might say first of all that among my more interesting activities in architectural education are the years I spent as a teacher at the Boston Architectural Center. It was here I first met Dean Cascieri, who incidentally looks exactly the same as he did those several decades ago. I also might say that I'm here largely because of an invasion of flu germs, which germs are apparently now feasting upon Charles Moore, and also be-

cause of Mr. Geddes' trip to Europe. However, and perhaps fortunately for you, I did not have sufficient time to prepare a formal paper and my presentation this morning will consist of an invitation to visit our college in Blacksburg—to share, for the next twenty minutes, the thinking of our faculty about the kind of things we believe we should do to provide our students with a stronger grasp of the intellectual and physical realities of contemporary life and to prepare them to act effectively as architects and designers of man's surroundings.

On behalf of the faculty I would like to start your visit by telling you first what we are now planning in the way of curricula changes, then to discuss with you some of our reasons for thinking these changes to be advisable.

Our College of Architecture is one of the six colleges of the Virginia Polytechnic Institute, which as the land-grant university of Virginia has a three-fold mission: in education, in research and in extension service to the community. In our college, we are charged to develop our programs within the context of this overall mission of the university.

The College offers a range of programs and options, concerned with the shaping of man's physical environment, in architecture, in urban design, urban and regional planning, building engineering and building construction. Each represents an arbitrary division of a total intent and each needs to be aware of the problems common to all as well as to be concerned with the mastery of the techniques and knowledge unique to its own area. We think it pedagogically of value to educate for them together and in fact intend to add to our offerings. These related programs provide the college with access to a range of faculty which might not otherwise be possible and this range is imperative to the restructuring we are now proposing.

Beginning with the coming academic year, we propose to change the architectural curricula (as the first of a series of changes to extend to all of our design curricula) in a way which will afford the student access to three levels of learning. Each level or division will be two years in length: the lower division will combine the 1st and 2nd years; the 2nd division, the 3rd and 4th; and the 3rd division, a 5th and 6th year of study.

Each division is intended to comprise a total unit of experience—progressively increasing in depth and in intensity by level—developing at each level the full range of those considerations with which architecture should be concerned.

Within the divisional structure the greatest initial modifications will appear in design studio work. We propose to eliminate the studio system and revise the current assignment of one architect or studio master to 15 or 20 students—a ratio which is now held more or less constant from the freshman year through the fifth year, and to replace the studio master with a teaching team.

The team of teachers will consist of one coordinating faculty member for a division, and of architectural design and specialist faculty for each of the years. In the lower division we are now proposing four FTE faculty for a unit of 150 students. This ratio will differ in the second division but we have not as yet examined this division in the kind of detail which will let me tell you the teaching modulus to be proposed.

Future design studies in the undergraduate curriculum in architecture will be conducted in experimental laboratories (possibly

with work ungraded) and these studies will parallel a seminar-workshop sequence. All of the faculty, irrespective of the year in which their major contribution to the lecture curriculum might occur, will participate in the seminar-workshops in *each* level or division for discussion of their material in a way most compatible with the student's ability to use this material. In the first division, the treatment of subject matter will be descriptive. The student at this level is not yet ready, for example, for computational treatment of technical subjects but needs a grasp of the essence of their content for his problem-solving work in the design laboratory. The seminar-workshop sequence is therefore intended as the media through which the separate courses, into which the entire lecture curriculum is divided (and over many years), will be brought together by the faculty as a team, in each division, and related to the design education in the laboratory—hopefully as the beginning of a new, more rapid and more meaningful way of presenting humanistic, scientific and technical information.

In the lower division, the experimental laboratory and seminar-workshop sequence will be a *search* course. Process will be stressed rather than solution and we will attempt to remove the emphasis from “answers.” The work will proceed experimentally and not by authority. Faculty and students, as a peer group, will engage in joint endeavors of identification of problems and will explore the translation process of design from problem to space or form. Drawing board criticism, the heart of the present studio system, will be limited (although not eliminated) and the team faculty in seminar sessions with an entire unit of 150 students will attempt to develop the general nature of the problems with which architecture should be concerned and individual faculty in smaller design groups will lead discussions related to the specifics of an on-going design project.

Over a two-year period the entire range of scales of human settlements will be explored including design basics, architectural design, systems design and urban design, together with ways of viewing need and resources, both made and natural, economic and technical, and ways of translating need into form.

A variety of visual aids are now in development to assist in presentation and it is expected that case study methods and shop work will find greater application than they do currently—as new relationships between design work and lecture curriculum material are progressively developed in the search to simulate better models of reality.

Exploratory work done this past year suggests that the student will be able to move fast within this educational model and we are encouraged to believe that we can leave large blocks of time free for a liberal arts core of study to proceed *concurrently* with the professional core studies.

The lecture curriculum will be modified and rearranged. Presently offered pre-requisites and professional courses will be concentrated in the first three years. The lecture curriculum, in the following years, will be entirely changed and will include new professional courses in design science, systems analysis in design and performance, computer technology, urban morphology, and housing and urban development.

These will be presented in a new form in order to allow for sizeable blocks of elective time for courses in the humanities and the sciences, concerned with the growing range of intellectual and physical resources necessary to architecture.

In the 2nd division, the same techniques will be utilized but the student will move to new levels of professional sophistication and into new areas of competence, and will be encouraged to adopt the professional attitude toward design which he will cultivate for the balance of his educational career and following graduation. Design laboratory work, in a two-year sequence, will be professional in content, involving intense concentration on concomitant disciplines such as structure, mechanical services, methods of construction and their systematic application to socio-spatial situations. It is intended that the student explore the extent to which freedom of expression as a design factor involves decisions based upon the systematic needs of structure, mechanical services, flexibility and growth. In the fourth year, the horizons will extend to urban systems investigation and include systems analysis, computer applications and comparative investigation of new socio-physical systems of urban and regional design. Greater numerical weight will appear in special faculty as the student's area of concern shifts to greater professional and technical depth.

After satisfactorily completing lower and 2nd division programs, a student may elect the option of either a terminal 5th year or, if qualified, enter one of a series of two-year graduate concentrations to be offered in the 3rd division. These graduate offerings are to be heavily program-oriented and will include concentrations in resource planning, urban and regional planning, urban design and systems technology. They are intended for our own students although eventually we would like to have a fairly good "mix" from other schools.

It is our belief that environmental planning and design concentrations of these sorts are no longer amenable to serious development as separate and self-supporting disciplines and, at this level, we want to provide an academic and research accommodation for a community of scholars from related disciplines which have an interest in the city, the region and its technology. These faculty will come from the programs represented in our college, from other areas of the university or from our Washington Program in Urban Studies and will work with graduate students on study projects and in research activities, within the broad multi-disciplinary context we feel necessary to the deriving of valid data and necessary to equip the emerging designer or planner with the perception with which to meet the challenging problems of our time. The faculty-student ratio at this level of inquiry, I might say, is quite different from the lower division and we anticipate eight faculty for a student unit of forty.

The question now needs to be asked: Why are these changes felt to be necessary? Why modify the way we now educate for architecture?

We think this: The curriculum in architecture in our college, as I suppose it is in most, is characterized by a curious dichotomy. Design, which is the architect's basic tool, is a problem solving skill involving conceptualization and visual-emphatic projection. The people I am able to talk with about these matters tell me that emphatic projection cannot be taught as a discipline nor can it be conveyed as abstract knowledge. It is a process of doing rather than learning and it requires exposure to experimental experience. The information however which the student designer needs in order to design correctly resides in a lecture curriculum based almost entirely on verbal and intellectual abstraction. This alone would make it difficult for the young designer to use the

material in the quite different world of the design laboratory. To make matters worse, the lecture curriculum is divided into many separate courses, for convenience in instruction, and the year in which a certain material is presented may be such as to lend no support to design activities. For example, the information which the student may need in the first or second year of design may not be treated in the lecture curriculum until the 3rd or 4th year (while pre-requisites are being taken), and it is left to the studio master to describe this material and to interpret what it might mean in relation to a problem-solving design project of the student. As a result, studio exercises are conducted at a level pretty close to that of a craft and while this may have worked reasonably well in the past, it appears nowhere near what is needed today and less likely to be adequate for the future. The occasional use of "consultants" in the design studio has not seemed to alleviate this situation.

While the present curriculum in architecture provides the student with a self-confidence and a buoyance, it has led generally to a facile approach and has provided little grasp of the vast potentials which the physical and social sciences have made available.

The habits of mind and patterns of work which develop in educational programs tend to be carried into later professional activity. Except for the efforts of only a very few, architects have not in the recent past dealt effectively with, nor have we created solutions acceptable to society. We have come to grips with the more trivial tasks and have not become involved in the decision-dynamics which form environment. We have designed what we have been asked to design and our "solutions" have been highly personalized, concerned with physical realization.

The leadership in our professions are now clearly aware of the inadequacy of this situation and a new commitment is being generated for participation by environmental designers in the full range of scales of human settlements. And there's a growing tendency to do something about it, to focus the attention, as Mr. Giurgola said, on the critical social, humane and aesthetic challenges which confront us.

I was not able to attend yesterday's session entitled "The Forces Which Are Shaping the Role of the Architect." Had I, however, I'm certain I would have heard something of these challenges and specifically as they relate to the extensive and growing range of intellectual and physical resources which the architect is going to have to grasp and to manage. Unfortunately, in the construction of a model for design education, factual material appears to cause trouble. If we expose the student to large portions of unrelated factual and informational material prior to the time he begins designing, whether humanistic, scientific, or both, and no matter how noble our intentions, the material tends to get in the way of design. It remains unrelated in his mind and he appears unable to form this information into unified concepts. An equal concern is that when design work precedes the range of information necessary to design correctly, superficial habits of design develop.

It has been the decision of our faculty to try to bring about a balance between these two approaches; to recognize the nature of the design process and its experimental requirements, and to attempt to relate lecture material to design activity in new ways and in concurrent progression by level, as I have described for you.

Most significant to us, I believe, is our feeling that in our design laboratory and seminar-workshop relationship we may have a new means of communication and a new technique for transfer of information from other disciplines necessary to design education, and we are now looking to find ways to include more and more of the usual lecture offerings in the seminar-workshop sequence.

This is about the end of our visit and time only remains for me to say that we are looking to the accomodation of thousands of students rather than the hundreds we now accommodate and believe this new structuring and new teaching modulus may let us do this and not be overwhelmed by numbers as seems inevitable in the more conventional curricula.

We also intend to so relate our various curricula, as we continue our developments, to permit a succession of changes to be made from time to time by a student, both as to the direction, the breadth of knowledge and the range of skills one wishes to acquire and for termination at various levels depending upon motivation and capacity.

All of this adds up to a kind of searching willingness to try to provide an education for architects which will prepare them to play an effective role in bringing order, form and vitality to man's surroundings in the historic present.

G. HOLMES PERKINS

Our third speaker this morning has been a great friend of architects for many years and I think it's a particular pleasure to welcome a lawyer in our midst, a man who is also a city planner. You will remember him as the former head of Beamis Foundation at M.I.T. He is also now a member of the Planning Institute as well as the Architects and is a member of the Fine Arts Commission in Washington. Such diverse talents are quite rare in this day and age when we thought the Renaissance was dead. And therefore it's with particular pleasure that I welcome the Dean of Cornell, Burnham Kelly.

BURNHAM KELLY

It's a pleasure to be back in a group where I don't have to explain that I'm not an architect. This has always been very valuable to me. Believe me, it's much easier as a dean to tell the president how important architects are if you don't have to blush while you are doing it. And it may be useful to me today to tell some of you how important architects are without blushing because I think sometimes the aspects of architectural education that are most important are understressed by the people who take the most important parts of it for granted. However, my major theme in this presentation is not going to concentrate on the basic center of architectural education but to talk about two other things: first, when should we begin this education, and secondly, how do we provide the necessary base in the sciences and in technology? These, as you will immediately recognize, are problems of great concern to almost all architectural educators. But this means that I'll give almost no attention to the usual central theme of how to train the professional. Obviously some of my prejudices on this subject will emerge as I go on.

The first question, then, is the professional decision: when should it be made? I think it's a truism that in education today people assume that as many years as possible should be devoted to

rounding the man and deferring the professional decision. In law and in medicine it is necessary to have an undergraduate education to start. In science and engineering for all practical purposes education is at the graduate level and I needn't tell you that throughout the country the trend in architecture is to increase the number of years and to increase the tendency toward graduate education. I don't challenge this as a general principle but I'd like to ask some questions about it and I think they're useful to keep in mind.

First, is the rounding of the individual always useful if you assume that the individual is not yet able to make a mature decision? It may be that this rounding is in some degree a spinning of wheels, wasting of time, and frustration. The next question, is maturity always delayed? Are we now always getting immature people into college? It's my experience that we are getting a large number but by no means all. Some people at 17 or 18 have a very strong, intelligent and mature mission, and some respect should be paid to this possibility.

The next question concerns the future role of the secondary schools in this process of maturing and rounding the individual. We have no doubt that some first-rate secondary schools are doing a magnificent job. The training of the boys and girls that we see these days is unbelievably better than what we ourselves got or than most of what was given as recently as ten years ago. And there seems to be no doubt that we can put an increasing load on the schools. The Physical Sciences Study Committee has done this, the Mathematics people have done it. We obviously can also do it.

The next question: is a rounded education the way to get a rounded man? From your experience is the answer necessarily "yes"? I remember coming from Williams College to M.I.T. and wondering if we made narrow people whereas Williams made well rounded ones. I'm sorry to have to report that a lot of my colleagues at Williams were very well rounded but still take almost no role in their society. On the other hand I know some M.I.T. people who, having graduated after four years of not taking their noses off the slide rule, have tried to find out what the story is and are some of the well rounded people in the community.

I don't think that general education necessarily produces a rounded person or if it does that this rounded person is necessarily what we want as a preparation for architecture. And I think that you will find that the university today is not dedicated to the proposition of turning out rounded people. My university, Harvard University, nearly any university you can name, is really a congeries of specializations. The minute you go through the slot in the secondary school that fires you through the S.A.T.'s and the admissions procedure into the great university, you are immediately confronted with the necessity of choosing which one of the slots that reaches down from the graduate schools you are going to go into. Very little time is allowed, very little energy is devoted to becoming rounded. What you are doing is selecting a profession. The profession may be called "English" or it may be called "Teaching Latin Literature" or it may be called "Physics" but it's a profession nevertheless. I'm not sure that I think this is good. I'm only reporting that I think it is a fact.

Now another question, and one I feel free to speak on as a non-architect: should design be preserved as training for architects and for the rounded image of architects or is it conceivable



that what is done in architectural schools is a pretty good form of general education in itself, at least one aspect of general education? Here I could spend the whole time allotted to me because I honestly believe that it is. I honestly believe that one of the major problems a young man faces these days is the horrible fact that most of the issues he deals with after graduation from a university have a very high content of intangible, unanswerable, human problems, unlike most of the things he's dealt with in the university where the issues were presented to him rather pure. They've been processed for him into the form of physics or perhaps English literature where at least all of society is not involved. In art, and in architecture taught as art, there's no escaping the fact that every practical decision is surrounded by intangible, unanswerable, nasty problems, and that a human being in order to become a human being has to learn how to face the fact that he doesn't know the answers but must nevertheless give an answer. This education is more generally valuable than architects recognize. Certainly the engineering school at Cornell, and probably many other engineering schools, has been anxious to find out how this is done because they would like engineers to be more aware of the importance of stepping around the guideposts and rules of thumb to cope with some of the real issues.

Not only must an individual express his point of view and learn to do so when there is no answer but an individual has to learn to commit himself. This is a very difficult problem. I needn't say it to you. You've all been through it. To go through a series of issues and come up with a view and stand on this view is not easy. One of the reasons I think economics deserves its own appellation "the dismal science" is that the economist will always define his problem so that he needn't make a commitment. He will state his assumptions explicitly and carefully and manipulate all the data within these assumptions and tell you this is the answer. If you ask "Is it the answer to my problem?" he will say, "No, it is the answer to the assumptions that we have discussed." A sociologist will do the same thing. Ask him, "How do I cope with these problems of human nature or social organization?" and he will come up with very interesting observations on how the system works. You say, "Now that's very good but what do I do with it?" and he says, "That's up to you. I'm not sure my system is true, but it's a pretty good description and it has no predictive quality whatsoever."

We have to learn as human beings not only to cope with intangibles but to take an individual point of view. I think education in design is useful for this purpose. So you can see that I'm making a case for the early professional education. Not for everybody, not necessarily for all architectural professionals. But at least available for all people who would like to get this kind of training and certainly available for those young men and women who at 17 or 18 know that they want to be architects.

Let me approach this from another point of view. Let's talk, if we will, about what I call basic communications skills in the human being. The obvious one is the verbal one. This is the one we're using today. It's the one that's used in all education. And it's the one educators feel most secure about. If a young man graduates from high school with straight A's in most fields and all A's in English and gets a very high S.A.T. score on the verbal section and on the English College Board one predicts that he will do

well in college because he knows how to read and write and talk and that's most of what he'll be doing in college. He has a high verbal communications skill.

In the last half century we've learned a good bit about another basic communications skill, the abstract symbolic skill. This is the ability to deal with mathematical and physics symbols and it is not necessarily related to the verbal skill. It's a little harder for university people to cope with this one. It is true that if you get a boy who has all A's in math and has a high mark on the S.A.T. math section, you tend to feel that he's likely to have skill with abstract symbols but our experience is a little rough here. The S.A.T. math is largely an accounting exam rather than a conceptual exam and it is known that a number of people will go just so far in mathematics and stop. They often stop just at calculus for some reason. But there are people who go on through and you can recognize this skill and if you do recognize it, believe me you ride it. A young man who is at the top of his class in secondary school in math may go to Antioch, or Harvard, or Cal Tech, but he's going to be taking math all through his four years and don't think that he's getting a "general education" or "deferring his professional decision." We know that if he doesn't take this math a tremendous opportunity may be missed because some of the greatest contributions of mathematicians are made at age 21 or 22 when their brains are young and can twist into new ideas. In fact, the last time I checked, one could take more math as a Harvard A.B. candidate than as an M.I.T. S.B. candidate, because M.I.T. requires 20 percent humanities and Harvard doesn't.

Now let me come to the third basic communications skill and this, for lack of a more general name, I'll give the rather unpleasant one of the concrete symbolic. This is like the abstract symbolic but it deals not with abstract symbols but with concrete visual forms. This includes sculpture, architecture and many of the other arts. And this one, of course, is still very suspect. We don't have many educational processes for this in the secondary schools that are any good. We have no valid tests to check it. And I don't accept the present Princeton tests. We don't really know how to move in this area except that every one of us who has ever had anything to do with architecture or gifted architects knows that it exists and that it's exceedingly important for the top designers. Whatever words they may use, it is this skill that really shows in their drawings. I think that we can assume that a certain percentage of our young people have this skill. My argument is that it would be just as foolish to tell them to spend four years on Hindu philology and save architecture for graduate school as it would be to tell the mathematician to spend four years on Latin poetry and then come back to math.

Now one more thing and that is if you confuse these basic skills you may confuse your product. Let's take the architectural education in Cambridge University in England where it's part of a good university education. The students come from one of the best secondary school systems in the world. They study problems with broad humanist points of view and have an intellectual approach to the problem which nobody can challenge. And the English system turns out some of the world's best writers and critics of architecture. At the other end of the scale, with apologies to Mr. Giurgola let's take some Italian boy who with his mother's milk draws an ability and a love to design. He designs his own car. He designs his house. He designs his mistress' dresses. Design is everything but he is not particularly

concerned with the housing project. He is not particularly interested in economizing. He is the artist without a social conscience. Clearly an architectural education must fall somewhere between these two extremes if it's to serve its purpose. We want to have people who have critical ability without being critics. We want to have people who have creative ability but also have consciences. We don't want historians rather than designers. We don't want theoreticians rather than workers. And we have to recognize that some ability to identify, to use and to bring into full flowering this communications skill that I call concrete symbolic is essential.

Now you will note that the assumption of everything that I say is that architecture is an art. Here you may say is the typical educator's fallacy—he doesn't recognize how many things go on in the world where this art training doesn't help. True, very true. It's true of every one of the professions. There isn't a profession that could possibly teach in a college career what the professional needs to know for his practice. It can, however, give the essence. Not necessarily the major part, for the major part may be made up of such ingredients as common sense and construction sense and human relations skills and managerial capacity and these things the professional learns and continues to learn all through his professional life. Some are things that can't be taught in school and some of them can.

I don't want to use Cornell as an illustration, but I will say one thing: at the moment we are unique not only in being a five year school but in putting all our general meat and potatoes approaches to the professional training in the first three years and opening up the last two years almost entirely to electives. One term is in New York City in our New York City program. The other three are largely elective and a sizeable part must be elected outside the school. Our program depends on two things: one, blind luck in admissions (we can't call it much more than that although we try our best) which depends in turn on the fact that we have a high degree of selectivity and that members of our own college faculty interview every single student who comes in. We know perfectly well that in an interview you find out only how good the applicant is at interviews, but what we're looking for is a genuinely motivated student. Does he know what architecture is? What has he done about it? You'd be amazed to find out how many straight A, 750 or 800 S.A.T. score kids will give you a beautiful description in an application, but when you ask them "Why architecture?" they say "Well, my guidance counselor says I'm good in art and I'm good in math and that makes me an architect." This kind does not get into the Cornell program. He may be a star at Harvard four years later but he's not going to get into our program because the program is set up for those, and there are many of them, who can already argue with us about whether Mies or Corbu is the better man and who can tell us who designed every good building in his city. These are the ones we want.

Now we come to the second question. Clearly, architecture has another great problem and that is how to feed into these people the whole scientific and technological base on which the profession must rest and which is becoming more and more complex. I don't need to stress what this base is because it has been discussed in prior sessions in this convocation. Obviously, the base is not now adequately provided in architectural schools. I predict that the way things are going it will not be adequately

I would suggest that the man who is ready for a professional education be given a concentrated introduction at once. Probably three years. Not much less and certainly not much more. After that he would go out for at least two years in an internship to be controlled not by the practice alone but by the practice combined with the universities. Something on the model of the hospital internship that a doctor gets. The architect would learn the building regulations, not just to master the building code of his city and forget it, but to understand the reason for the whole system of a code operation. The same thing for every other practice element. Built into this practice experience would be a whole series of challenges regarding the way the practice operates, the kind of problems the practitioner meets. Then this man comes back to a university program, not necessarily the same university, and studies two more years. He's now had a basic groundwork. He's had all kinds of practical illustrations of problems, and he gets two years of skilled teachers to top it off, after which he gets a degree and a registration certificate. This I think would be a nearly ideal architectural education. Full training to registration could take anywhere between seven to eleven years, and there would be some elasticity in the whole of the last four. I've sketched out a general proposition and I leave this with you to mull over yourselves.

By and large, in school, the problems become harder and harder. You can't cover everything. You can't even give a good understanding of many of these subjects in the time you have. What is worse is that in every school which I'm familiar with, and I hope Charlie Burchard can change this, the people who are primarily concerned with "How does it work?" and "What is the theory?" and "What is the technique?" become second class citizens in the architectural school. They shouldn't be. We all know they shouldn't be. When they graduate they are valuable. Some of them are the most valuable people in the profession. But this scars them and it scars their ability to learn and to some degree it distorts the whole process. I don't think the professional internship that we have set up in this country does a much better job. I don't think your offices have time to do a good conceptual job in coping with the technological background. I think you have to make decisions too quickly and I think that as a result the consultant and the contractor tend to dominate the designer in practice. The tangibles get overstressed and a whole series of basic possibilities and potentials remain completely unexplored because the motivation in teaching a skill isn't there in school and the time isn't there in practice.

Holmes Perkins has already mentioned the medical analogy and I use this frequently. I think we should note that the medical people eventually decided that the man who is going to be a practitioner cannot possibly know everything that he needs to know to practice. And they generated within the medical complex the endocrinologist, the anesthesiologist, and a whole series of people who learned their specialties as scholars and researchers in order to practice not with the public but with other practitioners. In think this is where we must go in architecture. I am beating the drum now for the point of view that we have to bring within the architectural schools a new stream of educational fields, people working with, related to architects, who understand and love architecture but who are working for Ph.D.'s and research degrees. Their role when they get out is not to build houses or office buildings but to be clinical practitioners who practice with the other professions and not with the public. We have to set these people up. I don't see any chance of their being developed in the engineering schools or in the general university environment. I think the architectural school itself is the place where this is likely to happen.

I think perhaps I should say just a few more things and then close. In the university, there should be a series of alternatives. It should be possible for some people to go in late. And it should be understood that the man who studies economics before deciding to be an architect is not necessarily a more valuable man than the one who becomes an architect and then studies economics as related to his professional interest. The time of the professional decision should depend on motivation and maturity of the individual student rather than on any general rule made on any general hypothesis of education.

G. HOLMES PERKINS

Dean Kelly has posed a lot of questions. I think in this period we would hope that you would pose the panel some questions or perhaps they have questions among themselves. Are there any questions?

QUESTIONS FROM THE FLOOR

BERNARD P. SPRING. I've been working with the grant given me by the American Institute of Architects to study the problems of architectural education. I'm filled with questions. This one is very important to us and I'd like to ask the panelists to try to respond. When we make changes in education—there have been many kinds of changes proposed here—how can we evaluate the success of the new way that we're trying? This seems to be a critical issue and we're searching for answers to this problem. Many changes look promising. When they are put into effect what do we then look for? How do we examine the students, the buildings they design and the world around us to see whether the changes we have made are actually responsible for improvement or not?

G. HOLMES PERKINS. I have a suspicion that a good many of us will not live long enough to know the answer to that.

BURNHAM KELLY. Well, I won't answer it. I will certainly say, however, that it's a tough question and I suspect essentially an unanswerable one. I remember when I was on the Undergraduate Policy Committee at MIT, we thought we would check admissions against performance in school and performance in after life. It was hard to check against performance in school and impossible to check against performance in after life because nobody could define success. Is a man who substantially removes himself from society for thirty years and writes the perfect poem a failure? Is a man who earns a million dollars a year building lousy bridges a success? We never could reach a decision.

CHARLES BURCHARD. I kind of agree with Dean Kelly and yet it seems to me we must try to come to grips with this and not dismiss it as impossible, particularly in view of the changes in curricula which many of us are now proposing. I've been talking with the directors of both our behavioral sciences department and our testing center at VPI to see if we could devise a method for evaluating the effectiveness of our new design laboratory notions and the new way for transferring information which we are now about to start. My impression is that this is no simple matter but we are going to try to find a way to do it. If Mr. Spring will ask the question in another few years, perhaps we may have to say that we failed, but not for lack of trying, I hope.

I'd like to ask Mr. Spring if, before we can evaluate new programs, he has a suggestion of evaluating the old one so that we know what we're comparing what with?

BERNARD P. SPRING. Well, yes we do have an idea of how we may evaluate. I'm not entirely satisfied with Dean Kelly's answer because implicitly when you suggest change in education you think that it's going to get better. If you feel you have no way of telling if this is going to happen or not, what's your motivation in life? You must feel somehow that you will be able to evaluate, although perhaps not rigorously or formally.

BURNHAM KELLY. I think we can't duck Bernie's question. The only reason we duck it is because we don't know how to answer it. He's quite right that the more we try to verbalize, the more we try to pin down our assumptions, the more we learn about what we're doing. We're painfully aware of this, but it's really hard. What we do at the present time is what it feels good to do. We just feel that something is not quite right so we feel it should be changed. Usually the change lasts about five years and since the whole program is about five years, there's never been a control that you could check.

BERNARD P. SPRING. I think I haven't really answered Mr. Savaroff's question, however, and I'll try to do that. We've thought many times of the value of looking at what is now being done. We find that so few people are satisfied with it that it's almost pointless to make a formal evaluation. The schools themselves are all in the process of change; they almost invariably say, "Don't look at what we're doing now, look at what we're about to do which is going to be much better."

BURNHAM KELLY. Could I make one more comment here? I said that architects sometimes tend to undervalue what is the most valuable. And the only thing I would say about this process of change is, not to throw away the heart of the matter simply because you've been doing it so well that you haven't noticed it. The typical graduate of five years ago writes back to his dean and invariably says, "We should have had more of client relations, office practice, how to make out a tax form, and so forth." These are things that he's faced with that he wasn't faced with in school. This does not diminish the value of the things he did get that he doesn't notice, partly because they've been well done and he's using them well.

I would like to challenge one assumption which I think is generally held here and elsewhere, that you are all ready for architecture when you get out of school. I think no matter how you

educate this promising neophyte he's going to go on learning until he is ready to retire. I consider myself a student and I've been in this game for thirty years. I think that education goes on forever and if you are a good practitioner of architecture you are a student for the rest of your days. I think that anything you do in school, anything you teach these fellows has to be predicated on your instilling in them the creative desire to learn for the rest of their lives. **APPLAUSE.**

Our discussion has been on competence whether with computers or with facts. Dean Burchard's comment dealt with competence and his effort to improve it. Dean Kelly seemed to suggest that Dean Burchard's effort wasn't likely to improve the conceptual skills. If I misunderstood then I'd appreciate clarification.

BURNHAM KELLY. I think you did misunderstand. I don't for a minute deny that what we're doing is useful, namely trying to give some understanding of these other problems to an architect. What I do say is that the kind of man who is skilled in computer technology is not necessarily an architectural designer and that the architect can understand some of this technology but probably can't effectively use it. This is true of a whole group of fields. In the technologies at the moment it's almost impossible to find a knowledgeable advisor whose experience allows for the design implications of his advice. Even though, for example, a big acoustic problem in building is the noise generated by the ventilation system required for the heat put in by the high lighting levels, and in the design problem all of these technologies must be used. The architect has time to understand the generality but not all of the details and I think we need to bring the detail men onto the team so that they will have the same motivation for good building that the designer has.

BERNARD P. SPRING. In case you bring them onto the team, are you prepared to call them all architects?

BURNHAM KELLY. No.

I don't know that I have a question. I am of the opinion that a well rounded education, that is a liberal education, is a necessary preface to the study of architecture. I might add that I was trained as an economist before I became an architect, and that's the proper sequence as far as I'm concerned. I would also submit to you that your own background of liberal education and thought probably better qualifies you as an architectural educator than the reverse sequence might. In any event, I think that in all of your positions you do have a tendency to deprecate the idea of a liberal arts education as a preface to a professional education and I think the reason is that essentially your boards of trustees could never approve of this kind of a transition. It's impractical economically. It leads to all sorts of complications. I think this is the heart of the matter, that architecture is a professional pursuit and has to be developed when people have the capacity to express themselves verbally. There are tests that show that people who come directly from high schools to schools of architecture can't even speak English properly, and it seems to me that comes even before the design capability.

G. HOLMES PERKINS. First of all let me scotch the notion that all Boards of Trustees are unwilling to allow schools to have programs longer than five years. Our own program is seven years

long and we have no dearth of applicants. They pay an outrageous tuition but they still try to break down the doors to get in. But you said a liberal education was a necessary prerequisite. I do not think I would agree with that. I would say that a liberal education is a necessity but not necessarily a prerequisite. In other words, if I had my choice I think I could design a better program for seven years, not lumping most of the liberal education in the first four and the professional education in the last three. It just happens that the way we set up our institutions we seem to get caught on this to some extent. I think that Dean Kelly made a very good point that he would put in a lot of the meat and potatoes in the first three years and allow more electives and more liberal education later on. I'm not sure that the reversal of the thing makes it necessarily better than the other way around. Your liberal education, just as your professional education, is a continuing one and I would like to go back to the statement that President Lowell made long years ago, in which perhaps he was describing the role of the architect. He said education is intended to enable people to make sound decisions on the basis of inadequate evidence. This is exactly what we're doing all the time.

CHARLES BURCHARD. I just want to add a word on the "well-rounded" education. It has been suggested that it may not be "well-rounded" at all. The usual secondary school student we get is full of factual information and is at home with verbal abstractions but what Dean Kelly called the concrete-symbolic—the grasp of a visual-conceptual language—doesn't show up at all. In the first few years of our programs we find ourselves undoing more than we construct. Adding two or four years of this sort of factual-verbal education only, on top of secondary school, and prior to the time one begins to explore a language of design, will likely do more harm than good. In our experimental work this past year with the *concurrent* transfer of a wide variety of types of information, at a level and in a way, compatible with the student's ability to understand it, we have found that it really becomes part of his translation process to visual form. Now the question is what sort of information do we transfer, but at least we appear to have established a basis for compatibility between verbal and visual systems and less conflict.

BURNHAM KELLY. I hope I made it clear but I wish to make it exceedingly clear now that most of my questions were to buck a trend. This does not mean the trend is wrong. If somebody asked me to make one architectural program for everybody in this country to take I strongly suspect that I would require that they have a liberal education or some part of one first. But I don't think that this is necessary. I think there are a number of people who are equipped to move in, young and strong, when their motivation and skill is there, and I think it's almost a crime not to let them get at it. In case anybody else is going to use my terminology, the terms are: first, verbal, second, abstract symbolic, and third, concrete symbolic.

I'd like to know what you educators are doing to educate people other than architects, students and otherwise, about what can and should be done in this field. I'm from the Middle West and I've come East and I'm a little shocked to see what's happening outside the schools and outside the ivory towers.

G. HOLMES PERKINS. There is no doubt that the education of our clients is a crucial thing. I'm not quite as pessimistic as you are. I think of the early days when Rudy Vallee was singing, and curiously enough a lot of people called it music. But slowly the level of understanding of music and love of music rose, and spread to a wide public. In spite of the Beatles, I would say that our concern as a society with the higher levels of music is greater than it has ever been in the past. I think this is true of the visual arts also, including architecture. Now we'll never have as much appreciation perhaps as we think we deserve. But we might be wrong, we might not deserve as much attention as we think.

ROMALDO GIURGOLA. I think that the school has been very active in these terms. For one thing there is the involvement with the city administration, with the Planning Commission. This is sketchy at the moment. It comes on a consultant basis. But I think that the schools are preparing and sustaining an interest, which in the long run will affect architecture and the public as a whole. I think this is a very relevant step in our time that the profession has been taking.

Since I have the floor I would like to include the other question put from the floor. I think that if the goal is this maturity of judgment then the kind of education received previous to professional training doesn't make too much difference. It's true that you can acquire a sense of maturity and judgment through, for instance, the manipulation of the craftsmanship but it is a long process, and has to start early in the life of an individual, let's say when he is almost ten, twelve years old. But there are people who have built up a tremendous amount of judgment and critical evaluation through this process of manipulating matters, let us say, and that includes other types of education besides a purely liberal arts education. However, I tend to agree with the gentleman that the liberal arts education is really the foundation of the American schools. European schools, and the university especially, become highly specialized so that this opportunity of education is extended to a relatively limited number of people and we have in this liberal education a tremendous treasure that has to be kept. It's the only place in the world in which it still exists in such a form and if the architect is still a generalist nothing could be better than this broad level of interpretation of the event.

G. HOLMES PERKINS. Let me just conclude with one short statement because it seems to me we've been talking for nearly two hours and there's one word that hasn't been used and I'd like to use it. I think we should take another look at the basic role of the architect. We have all by inference suggested what we thought the role was to be. But we have been to some extent talking about the issues around the edge of education. And I would like to quote one thing from Le Corbusier on the role of the architect: "The architect by his arrangement of forms realizes an order which is the pure creation of his spirit. By forms he affects our senses to an acute degree and provokes emotions. By the relationships which he creates he awakens profound echoes in us. He gives the measure of an order which he feels to be in accord with the world. He determines the various movements of our heart and of our understanding. It is then that we experience the sense of beauty." **APPLAUSE.**



RESEARCH AND NEW AREAS OF KNOWLEDGE

SEMINAR THREE

BERNARD P. SPRING, Chairman

I want to welcome you all to Seminar III of this second Boston Architectural Center Conference. I'm Bernard Spring, the Chairman of this session, which will deal with research and new areas of knowledge. All of the participants in today's discussion are deeply involved in the exploration of new areas of knowledge that can in some way lead us to a better environment for people. I'm going to ask each one of them to lead off with a description of his own work and after this to question one another about the implications of their particular endeavors. Finally we'd like to have questions from the floor that might generate further discussion.

Let me say, to begin, that it looks as though the day for research related to the problems of architecture and building has finally arrived. During the last fifteen years I've been to countless meetings at which people have made a brilliant case for the need for research to support the process of designing the human environment. I don't feel it is necessary any more to convince an audience made up largely of practitioners and educators that there is this need. I hope you've heard it before and are convinced. As practitioners we know how to make decisions under conditions of uncertainty, but we have strong motivation to reduce the uncertainty. We're finally beginning to see some support in the form of money and interest in research. Now we're faced with the more difficult problem of setting goals and priorities for this work.

In some ways, research related to human needs and activities and to physical facilities which we build to accommodate them is even more complex than research in some well established areas, such as space and medicine, that have for years been funded in the millions and even the billions of dollars. Yet we have less support than these fields and will have less for many years to come so I've asked the panel members to try to answer the question "How shall we set our priorities for the use of the limited resources that we are now beginning to get?" We can't work on everything that needs clarification and better understanding, but what areas of uncertainty are doing people the greatest harm at this time? We have to choose those areas of study which will give the highest return for the investment of time, skill, and intelligence in producing a more humane environment, that will enrich and support the activities and aspirations of man.

First, we must have an operational definition of these activities and aspirations. It's very easy to stand up here and say words like "the aspirations of man" but it takes a great deal of work to say precisely what is meant by this. But the development of operational definitions puts our research work in the political realm. We must also have a better idea of how our society will allocate its resources and how it perhaps will change some of

the commonly accepted assumptions about what people are willing to pay for. And this puts our research in the economic and social realm.

My own list of priorities may be clear from what I've just said. I believe what might be called "soft ware" research, the programming of needs and resources of people, must be emphasized today. It's not that "hardware" kinds of research should or possibly could be minimized but we do the best job of sharpening our technological resources and tools if we learn to program human activities first. Each time a design decision is made there is an implicit prediction about future human behavior. Just how good our predictions have been in the past I don't know. I can't know because there's been no tradition of feedbacks to tell us what happens to people's minds and lives in the places we build for them. Our first job is to find a reliable mechanism to complete the feedback cycle so that our predictions can bring us closer to our goals.

But I've said enough, and I want to allow the panelists to tell you about their work. So I'm going to introduce to you the first speaker, John McHale.

JOHN McHALE

We are going to be rather informal so I'm going to break the rules right away. I won't tell you in detail about my own work. In the very informal but lengthy discussion before we started we felt that the crux of our discussion was the future of architecture. Does it have a future?

If many of our remarks today are provoking and perhaps somewhat abrasive to the architect, I think you ought to forgive us. We're not unfriendly but our abrasiveness comes from a concern, a rather passionate concern, for the role of the architect.

Now, the future of architecture. We may notice that most of the discussion which has gone on so far in the conference has been about the present and past of architecture. We might begin by asking what kinds of lags are there in taking up innovative ideas in architecture either in material or attitudes or in fresh configurations of knowledge. What is architecture's record of innovation? At the moment it is not very good, I'm afraid. How long was it before steel was available, for example, and got into concrete to make reinforcing? It was a lag of about 45 or 50 years. Yet reinforced concrete is now one of our major materials and has been for about 50 years. We're largely using it in the same way as we used it around 1898 when we first got into that sort of structural game.

Let me take another example from the New York Times, Monday, May 9, 1966. "American bathroom rated low in study." A Cornell University team spent seven years and \$100,000.00 to find out that the bathroom is minimal in terms of contemporary knowledge, technology, values and attitudes. It's unsanitary, uncomfortable and often dangerous. Does this bode well for the future of a practice which allows one of the major components of the home to remain at this level of development? Forty-two years ago pretty good and rather scientific bathrooms were designed, well fitted to contemporary need and to the kinds of production facilities then available—yet architecture is still hung up on that kind of problem.

I could go on picking away at how rapidly architects pick up technological knowledge and how fast they apply it. I don't think that's the particular problem. I think the person who introduced

us pinpointed the question as one of software, new conceptual angles to the whole process of environmental design. My strong feeling is that the architect doesn't have to redefine his attitude to machines, to computers, to the technological process—but to the entire society. We should, in this conference, really attack the question of redefining the entire role of the architect.

Since the Renaissance what architects have been mainly doing is building ceremonial architecture, occupiable sculpture or decorative packaging. For the past hundred years, for the past fifty years, and the past twenty-five years particularly, the modern movement has been largely preoccupied with packaging certain important, glamorous, very attractive aspects of contemporary life. Corporate architecture and the housing of machines.

When it comes down to people the record is not so good. How many architects are really concerned with the home building market? I don't mean the home building market of the seventy-five or a hundred thousand dollar fine art product, but the mass market for housing, the underhoused three-quarters of the population of the world. Approximately none!

On the way up on the plane I read an 89th Congress Subcommittee Report of January '66 which I recommend to everyone—*The Decision Making Process*. It's a very good piece with comments by Mr. Eberhard and Mr. Ehrenkrantz who are present here.

Where is architecture in the decision making processes in society? It comes very largely at the very end. All other specialties from the politician downwards define what the architect is going to do. At the end he picks up his brief—it is all made up for him and he designs the kind of package that they've decided it ought to be. I would suggest to you again that one of the greatest problems at the moment that the architect faces is to redefine his role, not only in his local society but in the world society. The largest problem we have at the moment is that 400 million people have a rising wave of expectations around the world. They expect, and are demanding, a redesign of the social and physical environment towards their needs, desires, and requirements in world terms. No matter what you do to redesign any fine piece of local residential housing, if something happens on the other side of the world and a couple of bombs are dropped, it doesn't matter a damn. I would suggest, gentlemen, that redefining the role of the architect in world society is our central focus for discussion.

DONALD KENNEDY

What has just been said about architecture is true and applicable to both anthropology and medicine, two professional areas that I know something about from my past 8 or 10 years of experience. If you ask where the innovations in medicine have come from, they have very often come from outside of medicine. Relatively few of the leaders of the medical profession have been alert enough and self-confident enough to bring major changes into the mainstream of the practice of medicine. The same is true for the much smaller and less well known field of social anthropology which I represent. At the annual meetings of the anthropology society you find a great concern for description of the past but very little concern for matters of the present and immediate future—matters that in effect revolve around this issue of survival. And it is to this point that I think we need to address some of our remarks this afternoon.

As I listened to the speakers and the discussion this morning,

I felt as though I was entering a type of small tribal society. First of all, I had a sense of the tremendous importance of the humanities as the major stream of knowledge and support for architecture. And yet buildings are quite different from poems or paintings or pieces of sculpture. They are certainly larger and more difficult to move around, or to purchase for that matter. This morning the conversation very often turned to science and engineering, but seldom to the life sciences or the social sciences. Both of these fields of science have a great deal to contribute to architecture, but I agree that a sociologist will contribute little of immediate practical help in designing a new curriculum for a school of architecture.

Let me explain. In the early days of development in the social sciences, we were caught up with social reform, but later we learned that the situation was more complicated than we had first thought. At that time we began to spend more time on careful, empirical investigation of the way people actually behave rather than how they ought to behave. No matter how crude our concepts, theory, and method may be at this point, I feel that we need to develop more direct working relationships with the practicing professions such as law, medicine, and architecture. The time has come for us to get out of our libraries, our books, and our esoteric linguistic structures and to test wits and knowledge and concepts with the people who are shaping the world around us every minute of the day. John McHale just spoke about how the architect finds himself at the end of a long stream of decision-making behavior, in the process of legislative decision, or in the internal workings of the way buildings get built and cities get renewed. Unless we begin to ask questions and participate in some of the earlier stages where there's a greater degree of freedom, we shall have no one but ourselves to blame if we are left out when the truly formative decisions are made. Often all of the important decisions have been made by the time we have an opportunity to speak.

WARREN BRODEY

I thought I would talk about soft architecture, which is different from hard architecture in so far as it is not an architecture of shells and bones. It is an architecture of tissues and of time, of information and information control. "Life in the form" was the phrase used this morning.

What kind of form are we speaking of? The form of hard architecture is the form of solid blocks of right and left, of north and south, of inches, of long strips of things. This is not the architecture of tissue, or of movement or of time. Neither is it the architecture of life. It is instead an architecture which does not know the theme of obsolescence, the obsolescence that comes to all things as they change in form from moment to moment.

As I was thinking about the problem presented by our Chairman, I wondered how I would design a course of soft architecture for students. I would take up first the problem of unlearning traditions which are no longer valuable. The practitioner has the problem of extinguishing obsolescent customs. One might say that this process is fortuitous and artistic, but I say there is a science to extinguishing obsolescent customs. We are for example more constrained by former tools than we realize. When one draws a drawing of a building, one is limited to paper, to the X - Y axis, and to the constraints that have been applied by the paper and pencil technology. Within this media one does not have the capacity to talk about the rich flow of living things. What do I

mean by the rich flow of living things? Is that just so much more garbage? Is it mystically intuitive? The dialogue between man and his environment cannot be symbolized in paper pencil graphs, or in solid blocks of right and left, of north and south, of inches, of long strips of things. The sociologist, the anthropologist, and all of us here have had the problem of not knowing how to organize that dialogue so that we can think of it in concrete symbols as was discussed this morning. Each new media provides new simple symbols. Can computers help in representing dialogue? What is dialogue?

When I look at you I don't see forms in concrete. I see living creatures who are changing moment to moment. Let me be more explicit. Each of you puts out sound. Each of you puts out heat. Each of you moves in a particular manner and processes information in a particular way. Each of you has characteristics which are definable but these characteristics are not definable if one is involved with the old model of A causes B, B causes C, and C causes D. If you try to model the human dialogue with his environment in terms of this kind of linear approach, you will get nowhere. It's like adding up people to try and make a group. A group is more than the sum of its people. The dialogue in a group develops a movement, a flow, a richness, which like the mass of people at a ballgame gets excited and its excitement builds excitement. This is a non-linear process—a growth process. And so it is that our human displays, for example the sounds of our moving bodies and our voices, reflected constantly by the walls and back to us, give a kind of dialogue with the walls of the room, with the air in the room, with the heat of the room. This dialogue with the environment is beginning to be definable.

Now how do we approach this with students? Through our space explorations, we now have a capacity to develop sensors which can tell us about the information output, the physical qualities of a person or a group of people. We have a telemetry technology, that allows us to measure with minimal interference with people behavior. We have the capacity to make measurements on people that we couldn't make before. We have also the capacity to simulate environments so that we can build environments to surround a person and get his changing reaction as we change the environment. If we try to change the environment in the old style using a linear kind of model, we would go from A to B to C without regard to how the person is responding. Now it becomes possible to change the environment as a function of the way the man changes in response to his environment.

Let me give you one simple example. It is now possible, though still difficult, to map the places where a man is looking at the printed page or the display on a computer. We hope to be able soon to change the way the computer sends its information as a function of the way the man is looking at the display. Real time computation allows the development of new media as responsive as tissue to its changing environment. The contrasting limits of paper and pencil are evident.

We are capable of changing the environment as a function of man's response to the environment even while he is responding—in microsecond time. We are capable of driving that change to see what kind of parameters change as we drive his changing. For example we can change the lighting of a room as a function of the way the man's pupil reaction occurs while it is occurring. We can radiate heat from the walls of a room in terms of where the person moves in the room and the heat he radiates. We then

begin to move into a situation where we can build an environment which changes in response to individual variety, or group variety. We no longer have to build environments which essentially program or automate the people who walk into them by treating each as the embodied average of the many.

Our task for the future is one of enhancement. Our architecture of the past has been one that preserves the inertia of our tradition as well as its beauty. Our architecture of the future must use individual variety and, more than that, build so as to explore the possibilities for enhancing people. By such enhancement I include the enhancement of our capacity to perceive. When architects brought color into architecture they began to help people learn how to use color. As people who are interested in the definition of an environment which is responsive to the human being, we have an obligation to facilitate the human's own need to evolve in a way that preserves his variety and enlarges his individual skill.

This is what I would teach in a course on soft architecture. With the help of fresh young minds we would spawn new resources.

EZRA EHRENKRANTZ

As a further example of Dr. Brodey's thesis I will now have to change my remarks. If we begin with the needs of people and the way these may be described and start being used as a basis within the building industry and try to organize to meet these needs, I think we find a considerable number of obstacles in terms of the way the building industry tradition works. Mr. Spring asked the panel to talk a bit about priorities for research in terms of the future of architecture. Perhaps one of the major areas for research is in the development of mechanisms so that the needs as expressed by Mr. Brodey could be met within developing technology so that the technological lag does not result in developments becoming obsolete without ever being used.

The simple requirements of competitive bidding are an obstacle to innovation. A single architect working on a single building might solicit the aid of a manufacturer to develop new products, but he will find that any innovation based on research and development on the part of that manufacturer must be available from at least two other firms if he is to have a valid bid. This manufacturer must then give up rights to the development which in turn reduces his interest in doing the research to come up with new products. In the same way, a general contractor, faced with new products to be installed in a building for the first time, has a learning curve which requires the addition of a certain amount of dollars to be charged up to contingencies thus making it more difficult to bring in new products at a reasonable price. I think there are many such obstacles, related to codes, jurisdictional disputes, ways in which sub-contractors shop manufacturers, and to the entire process within the industry.

But a lag does not exist because people want a lag to exist. It is there because our processes do not allow us to reduce the lag as we should like. Therefore, I believe this is one of the major places in which we have priorities for research in architecture. In our own work in California, on both the school construction project wherein the buildings are now under construction and on a new program relating to college dormitories, we are trying to work on this process. It might be well to give a short outline of the procedures that we are using. There were others to choose from

and we are by no means sure that the ones selected for our own experiments were right or that they are the only ones that might work.

We started to create a group of school districts as a large client body. Thirteen districts were grouped together, permitting 22 schools to be built with non-existent products to be designed to non-existent performance specifications. The performance specifications were written after work involving the curriculum people within the school districts. After stating the educational requirements we developed technical performance specifications so that manufacturers could develop new products on a performance basis rather than on a materials basis and wherein they could bid and each company would have the rights to its own development and not have to compromise these rights in a bidding process. Then the successful bidders proceeded with development work. The first schools are now under construction. Our work was to try to develop certain optimums within a process relating to the development of a means or a keyboard for design. As a contrast, in the aircraft industry optimization takes place for end products rather than for a keyboard. I think the principles of optimization are basic and people will proceed along these lines irrespective of any particular group's self interest. But the development of procedures can be so oriented that the optimization of a keyboard, of a palette, is just as feasible as optimization in terms of end products. It is interesting to note that the development of the C5A as a cargo plane by Lockheed was the first example in terms of military procurement where procedures for optimization were developed. In this case the market was \$2 billion and the manufacturer spent as much as \$40 million in order to be able to bid. Over the same period of time the number of schools to be built in this country is \$10 billion. \$2 billion per year for five years. So that we may be faced at some point in the near future wherein the two procedures for optimization conflict, that of a keyboard and that of an end product. Thank you.

BERNARD P. SPRING

Your response was directly in line with the questions I asked. I'd like to pose this question to you. If I were representative of a foundation and I had a million dollars available for research that would do something to improve the physical environment of human beings and I said I'd like to give it to you, what would you do with it Mr. McHale?

QUESTIONS FROM THE PANEL

JOHN McHALE. I just happen to have the program. We have in effect a ten year world student program (World Design Science Decade 1965-1975) which is concerned precisely with most of these problems. That is, with reorienting the education of the architect and planner in the direction of these problems. We say that architects will no longer be concerned simply with the end product of the building or even with a series of services around that building. Architectural problems, like all problems in our society, assume the architect's relationship to all the disciplines. All problems are, in a sense, world problems. All I would do is take your million dollars and plug it into our program.

BERNARD P. SPRING. Would you like to try to answer the same question, Mr. Kennedy?

DONALD KENNEDY. With a million dollars to invest I would make an attempt to understand how the entire construction system

works. I put that very carefully because we have some wonderful examples in the earlier comments. If the architect is being constrained inappropriately by building codes, then he should work on changing the codes. If standards refer to materials rather than performance, they should be changed. If dominant attitudes of the architectural profession cause it to become peripheral to the major volume of construction in the society, then it is necessary to change the educational and deviance-control systems of the profession to be sure architecture can make a major contribution to the entire man-made environment.

A few references have already been made to the tremendous developments in the military and space programs. When some of these new technical developments begin to emerge from behind the cloak of military security, they will have a tremendous impact on the way we do things in the civilian sector. Let us assume that an increasing fraction of our current expenditures for military defense will be channelled into the domestic economy. We can further assume that much of the industrial research and development associated with the aerospace industry will be redirected to solve the problems of our schools, hospitals, and cities. We must be attuned to these major developments if architecture is to have a significant role in influencing the design of man's environment.

WARREN BRODEY. If I had a million dollars I would find a group of really astute politicians, people who cared about the future, and perhaps through the A.I.A. or this institution here, I would try to set up a powerful group which would become involved with the problem of building codes. To my mind, the architect has a noose around his neck whenever he thinks of innovation because of building codes, and such a powerful political group from amongst the architects would be very effective. Two, I would then collect another million dollars, or two, or three, or four, mostly from government since they have so much of our money, for the education of the architect. Now, when I had three or four million dollars, I would then set about changing the education of architects so that architects had an additional technology which would be the technology of really comprehending the environment and man's dialogue with it, in specifics. I would, for example, want to spend some money on mapping the kinds of information output and input from the environment. But first of all I would like my group of political people who would also be money raisers.

EZRA EHRENKRANTZ. Well, I was thinking of initially using the one million to develop a proposal for two hundred million. The nature of the problem, when one begins to talk about building codes, requires that and much more. The complexity in the building industry is difficult to imagine until you start to work with each of the groups involved in a process representing change. In civics, we all learn that the strength of the United States is based on the fact that we have three major portions of government, each making sure that no one else gets too much power. In the building industry we have a hundred and one different sources of power, each with the right of veto, so we end up with anarchy. In order to unravel this, to make it work, and to develop the appropriate mechanisms upon which we can build and utilize research development in an orderly manner, involves an extraordinary effort.

BERNARD P. SPRING. You can see the keen minds we have on the platform; every one suggests that we use the money to get some more. I limited my offer to such a small amount, and a

million dollars is a very small amount to do any kind of research work these days, because that's the order of magnitude of money that is becoming available, and not the two hundred million that we do need for the job.

WARREN BRODEY. There have been attempts to rewrite building codes, in some cases with a blank slate open to the writers of the codes. Given that opportunity, what would you use as your format? A people-use based code is not yet possible; we don't know how to examine performance of people in buildings or in their environment. We don't know the first thing about it in a rigorous way. We know a lot about it intuitively. Anybody who is in the design profession spends a great deal of time observing performance of people, whether he's aware of it or not and he bases what he does on that observation. Yet even those of us with rich experience cannot observe enough performance to come to any firm conclusions about kind of performance we will elicit next time we do something. It's a very complicated issue. If we have limited resources for research that's where I would put them.

DONALD KENNEDY. It is difficult to acquire the broad empirical data needed to draw up building codes which protect against such unlikely events as fire, explosion, or earthquake. The disaster studies conducted in recent years have depended on a research team that was on call and was flown to the scene of a disaster as rapidly as possible.

Take, for example, the process of escape and the panic behavior of a crowd in public buildings. After the Coconut Grove disaster we made some rules about emergency lighting in case of power failure and about the way doors should open with panic bars or other devices. Then we went along for awhile until another disaster occurred somewhere. After each disaster one or two more specific directives are added to various building codes.

It seems to me that we have a real need for understanding the special form of interaction between people and the containers in which they may be trapped. In recent crashes of commercial aircraft, passengers were burned alive who might have been saved if we had designed for escape the way European railroad trains are designed, where everyone has a door beside his seat and the crowd doesn't have to surge to the end door. Perhaps the way to escape from a city building is not down, but either laterally to the next building across the gulf created by the street, or up by helicopter pickup. Perhaps all new buildings should have landing ports for helicopters. We need to think of escape behaviour on a collective basis in order to generate solid empirical evidence to support the revision of building codes.

WARREN BRODEY. Can I generalize from that a little bit? Gordon Pask, who lives in England, is a leading cyberneticist and a very fine man. Gordon has written a pamphlet called, "My Prediction for the Year 2000," and he points out that in the past we have built, let's say dams, so that the dam would at all times be able to handle a maximum flood: Now, given our new control capacities, it should be possible to build a dam with special control behavior which predicts and is intelligently responsive to the behavior of the dam's environment. In the past we have thought of our buildings as hard buildings unrelated to time and particular events in time. Time was something that was for all time. A great building was timelessly living massiveness of dinosaur vintage is traded off for control skill, a truth for all time. Objectivity was for all time. Now it becomes possible with control skills that we

have with computers, new thinking about control, to change the design of our buildings and our environment so that it becomes responsive to the shifts which might threaten that particular environment. Talking about disasters is *exciting*. We love it. If there's a fire on Beacon Hill, we all go to it. But when it comes to enhancement, making our individual lives more exciting from day-to-day, nobody has interest or money. We have to design our environment so that it will be responsive in terms of enhancement. This is particularly important in our development of schools to enhance learning, rather than schools that receive bodies and turn out well disciplined drones. Remember, man cannot compete with his machines in their capacity to follow recipes. Man's specialty is invention.

EZRA EHRENKRANTZ. Your comments of change in time bring to mind the analogies of the Victorian house with very little sophistication in terms of control and factors of environment but with an abundance of space which permitted a family to change its mode of life, have another child, a new hobby or perhaps an extra car within the family. Today we tend to design very much down to the limits. We have increased the controls. We have increased the environmental potential. We have taken away space. So that a new child, or car, or hobby drives people out of one house and into another. We cannot evolve within the environment that we build for ourselves, and so secondhand houses come on the market continually. There's no such market for secondhand schools or hospitals.

JOHN McHALE. We seem to be trapped on the platform purely in terms of the past. We are assuming that someone else has the initiative, someone else has the information. We refer to a lot of information coming from space as classified and so on. It's not classified. There's an enormous pot of that information ready for anybody to pick up. All that's lacking is the initiative. Where is the initiative? The politician? Not really. At the moment, in the world, all we are doing is reacting to situations and trends that have been building up for half a century, and in our general environment, we are doing exactly the same thing. To refer to this report on the decision-making process. By and large, the gist of it is that we can't make any decisions. We do not have any experts to make the decisions for us, so we keep assuming that the other character is the expert. That the man over there has the initiative, he can go ahead and use it. Let's go back to the architect! Here we have a discipline which fuses the sciences and the humanities. Here is the opportunity for one of the most integratable disciplines to pick up that initiative, to ask what are the major problems in the environment and to lay out plans for their solution. No one else, I can assure you, is doing it. Don't mention too much and too strongly the defense industry. The record shows it is not such an innovation to transfer their kind of technology and their kind of thinking to civilian problems. The Job Corps is an excellent example of where they've got into the act, and they're doing much better than the universities who do a very poor job. Each of those people, each area of the civilian sector, is just as effectively trapped in the past as we are. We have got to fight our way out of the school paperbag of the past, as you might say, and you can start right in this very room. Start writing a program for the next 10 years, or the next 100 years, whatever you want to do. We have the energy, the skill and the monies. You don't need the money to start with. You need a computer. And you have got it: between your ears. APPLAUSE.



WARREN BRODEY. You know, you get trapped behind that thing there, you get trapped behind this desk, space is trapping us all the time. Architects are experts at space, you can help with this. Now let me say one thing further on how we are all trapped. We are trapped in certain traditions. For example, I wrote an article which appeared in the A.I.A. Journal on Sound and Space. You and I are trapped in this room by sounds. Listen for a minute to that steady beat from the air-conditioning. How many architects are really involved with designing in terms of sound? Most architects design entirely in terms of visual sense. It is fantastic that architecture is considered one of the visual arts. What's visual about it? It's visual for the architect who can hire a good photographer to get pictures of a house for an exhibit, good pictures which may not resemble the house at all. I say that a man has many senses, which interplay with each other, and it's time we got involved with all of them, including this business of being able to move around in spaces. We DO need somehow to develop a technology that allows us to really sense all of our senses. In the past we have become captured. I myself have sometimes felt in a modern building like a butterfly or bird that is thrashing against the walls. It's about time that we somehow conceptualized man differently. You have been trapped by science which has intimidated you and all practitioners into thinking there should be a simplicity which denies complexity. My friends, there is no such simplicity. It does not exist. The computer that you have between your ears demands respect, but it doesn't and didn't get it in the science of the early part of this century. At the present time, science has transferred its interest to complexity. NOW is our heyday.

DONALD KENNEDY. I'd like to comment on that point in two ways: First of all, going back to your statement that there are senses other than visual, I think architects have carefully trained themselves and their students in a highly specialized visual sense, a certain form of X-ray vision, if you will. I have begun to acquire a little bit of this visual sensitivity by associating with architects and it opens up a new perceptual dimension.

The second point concerns the importance of the sense of hearing. In working with an architect and several others on the design of a children's hospital, I have been hit every time I entered the hospital by the great number of crying children. This loud sound was unnerving to me but was not particularly disturbing to either the architect or the pediatrician. I believe that sound control and modulation are part of the design of a children's hospital. Can't we think of a hospital as a place where, no matter how carefully and tenderly nurses handle sick children, they are going to cry? I can't help but believe that an alarming sound provides a fatigue factor for all the people in that hospital. Furthermore there is contagion of anxiety as cries sweep through the wards. In addition, the senses of touch and smell are often forgotten in the design of buildings.

The architect is in a truly unique position because of his long-standing tradition of synthesizing and integrating knowledge. In the present era we have an elaborate division of labor, and it is only through specialization that people are rewarded in their occupational career. We are getting ourselves into a bad trap because certain activities in this world require integration, coordination, and synthesis. This is a central problem for the profession of medicine as the process of specialization continues unabated.

QUESTIONS FROM THE FLOOR

BERNARD P. SPRING. I hope that some of the stirrings I detected in the audience earlier were because you had burning questions. Or speeches. We want to make the remainder of this session an open forum. I'll start now by asking anyone of the floor if they have any questions that they want to state directly to the panel.

Do You Think We Are Overlooking Basic Research Because We Are Too Much Involved With More Research In Areas Of The Concrete?

WARREN BRODEY. What I have been talking about is really research in the concrete. I have been talking about the communication between something that is concrete and a human creature. This is what the architect is expert at, and at the same time our language doesn't encompass most of this which we call intuition and beauty, so that you have no way of telling someone else what you're doing; when it comes to the educational process all you can do is carry on by apprenticeship. The only problem with apprenticeship is that with large numbers of people it's not efficient. In a way, the problem of the architect and his education, and of research in architecture is precisely, as the gentleman said, how to specify this concrete symbolic skill. We can't do it by turning it into words. We can do it by synthesizing some of these environments so that we have the man and the concrete symbol together and essentially make measurements of their interaction rather than talk about whether a building is beautiful or not in specifics. The intuitive will always exist, we need to specify when we can. Beauty and such words mean different things in different contexts. We need to build the rules that allow you to take a complex system and make it simple without killing it. I would like to do an experiment with this audience to make what I've said more explicit. I tried with doctors and they had the damndest time finding their own pulse. Maybe architects are better at it.

The experiment goes this way: Put one finger on your pulse so you feel it. Now start tapping your foot in time with your pulse. And tap it fairly loud. Keep it going. (The assembled group beat and try to fight off synchronizing). Now, is there any question in your mind but that you are building up a regular pulse? How many people thought there was a regular pulse that developed in the group? How many thought there wasn't? Well, we can't really test this and all I am saying is that a complex social group like this does have a pulse and that pulse of a complex phenomenon has a certain kind of simplicity to it. The phrasing of a dialogue in time is not random. There are definite constraints within which complex interdependent systems operate and the science we are talking about is not the science of words, but the science of these pulses, of discovering those simplicities which can illuminate the complex systems placed within our control by our new tools. You cannot get that kind of simplicity by trying to add the old simple systems into more and more complexity. You have to go right to the complex and unravel it and that's what you folks are expert at.

DONALD KENNEDY. I'd like to comment on the concrete symbol process, because I have had several opportunities to watch it in action. When I first started working with an architect, Delbert Highlands, we had the implicit assumption that the process of design should start with programming. At that time, I didn't know what programming meant. I thought it was what you did before a computer could be put to work. I soon learned that it concerned

the initial communication between the architect and client to determine what the client really needed and what kind of activities were to be housed. The programming of a pediatric teaching hospital proved to be a very complicated process. The time clock was running on the research project and the designer was eager to begin, so he started designing. He had never studied a hospital before, but he started designing just the same. We exposed ourselves constantly to the hospital. We walked all over it. We talked to people in every area. We went on tours with different specialists who pointed out what was of interest to them. It was fascinating to see what happened as this experience was brought back to the drafting room. Sketches, not words, became the means for understanding complex relationships. Here was a whole medium of analysis and synthesis that poured forth on thousands of sheets of paper.

Let me jump to another example of the concrete symbol. I was privileged to join a sculptor, two design architects, and a landscape architect in a design competition. Here was a contrast in symbolic modes because the architects were used to working with paper and pencil and the sculptor was not. The sculptor immediately went to his studio and proceeded to create the design setting in miniature. He had the parts all fastened down so they could be removed and modified. A fascinating conflict and problem of communication between cultures developed as architect and sculptor began to wrestle with the approach and to see that it made a great deal of difference whether or not you worked with tangible physical materials. Once, discussing lines of energy and perception, they climbed on stools and placed long sticks of wood on the model. All of this action related to a tangible model assisted the team members in resolving their differences in symbolic custom.

EZRA EHRENKRANTZ. We had some rather interesting programming problems when we began to work on the school project. Working initially with separate groups of educators, as most of our team were architecturally inclined, we found that the educators considered themselves experts on everything to do with physical space, but they didn't know very much about the educational planning that would take place. We then had opportunity to meet with all the architects who would be designing the individual buildings and discovered that they had great ideas on the educational process, but didn't think that there was any architectural problem whatsoever. They were afraid to work together because each was stepping on the other's toes and saying their own problems were relatively non-existent and so it was rather interesting to work with the educators and their architects until they could see what the basic problems might be. We noticed that the educators continually thought in terms of how the last school had been designed and what revisions might be made. They did not know about or consider any possible innovations which would change the entire basis of decision-making as far as they were concerned. The same was true with the architects with respect to education. In this impasse, we discovered that there were really three schools to be designed within a single campus: The actual school that would be used, the school to be used if the teachers that the superintendent wanted had been trained by the teachers' colleges and the school that they would like to use if they *could*, in fact develop new programs for teachers being trained by teachers' colleges. So, going back to Dr. Brodey's concept of a space-time relationship, of designing buildings which could evolve in time. The statement did come

out of the program that what we wanted for the school districts was a school which would be a laboratory for its own evolution.

WARREN BRODY. May I ask a question of the architects? Is there any really active central body that acts to advise on research proposals? Do you have a political action group representing architects and their interests in architectural research? A central body where any particular university or group could get advice on money available, on framing a research proposal, and so on.

FROM THE FLOOR: Not recorded.

JOHN McHALE. I assist one of the English magazines in environment control research. They wanted a special issue to examine where we are in environment control and where we are going to be in the year 2000, 35 years from now when students and younger architects will be in full working practice. Surveying the scene, I found that no environment control research of any value is being done in architecture. It's being done in space. It's being done in under sea research, the work of Cousteau and the undersea labs of the U.S. Navy. The work in ancillary transportation, or the kinds of nets that will serve these new environment controls, such as the Russians are beginning to employ in Siberia and we are beginning to introduce in Africa, is not being done in architectural research laboratories—not for lack of money, but lack of adequate concepts. A moment ago I mentioned concrete symbolism. Concrete has little to do with it when the bulk of our technology, ninety nine percent of it, is beyond the visible frequencies. Unfortunately, architecture seems completely hung up on the visible. And consistently the panel stays with the present, describing what we are doing now. I wonder if at the end, there will be anything which even refers to the future. I would suggest seriously to you, gentlemen, unless you watch out, architecture doesn't have a future in terms of environment control on this very small earth we now have. We are speaking in terms of a very small closed ecology. All the mechanisms of that closed ecology are presently being designed; they are not in your hands at all. You'll be asked to come in to decide on the trim of the table, the sort of plastic you might put around the edge. If you want to have that kind of function, to be decorators and cosmeticians, O.K. Go on as you are, and talk about architectural research in concrete terms. If you don't want it, start talking about the future.

I'd like to address myself to that very point. In fact, I thought the panel got off in a rather discouraging way when they began to give attention to the building codes that we are living with. It's not unlike Lady Bird's attack on the urban problem, beautification. And to me it's really unfortunate in the sense that it pays attention to symptomatic aspects of what is a major chronic problem that is yet to be defined by the architect for planning professions. It is unfortunate that the architect's continual misuse of terms such as networks, such as systems is so contrary to a science approach to the same term "systems." One wonders whether systems really applies to the Vierendiel process you see upstairs. Is this really systems in terms of urban solution? I submit to you it isn't. We are not directing our attention to the urban environments in which we live and we do not have collective drive among ourselves to direct our attention to them. We haven't made these definitions. There is a great deal of emphasis on the definition of architecture, but again it is another

beautification of the city movement. Perhaps the term "architecture" is archaic in a sense. We can involve ourselves at the level that most of us would hope or, as you say, ultimately become interior decorators or the plastic designer for microphone heads, etc.

BERNARD P. SPRING. One of the questions we are trying to answer in the research sponsored by the American Institute of Architects in architectural education is what specifically should an architect be able to do if he senses this broader problem, if he senses his role as peripheral? What does he then do? This is the question I think you were asking. What can he do Monday when he goes back to the office to effect the change that we have been saying is necessary.

DONALD KENNEDY. I'd like to suggest that when you go back to the office, you seriously consider the possibility that most architects do not understand our present use of the word "research." Anybody who works in the humanities is concerned with history, so if you are an architect, you read books and you visit buildings. You take pictures of them, sketch them, and walk around them as they are knocked down in preparation for urban renewal. This form of study has been operative for generations in the humanistic disciplines. It is not research, however, as we know it in nuclear physics, in molecular biology, or in the social sciences. Architects interview clients but they use no systematic research methodology to collect information and to control for error and bias. I seriously propose to you that architects need to become more realistic and accurate in their understanding of empirical research as it is practiced in the life sciences and social sciences.

WARREN BRODY. Let me add a word to that: I was at a meeting of psychiatrists last week and the same issue came up. They are in the same position and their research is in about the same state. I told them that most people of my age have grown up in a tradition of research which was appropriate to somewhere around the 1890's. There was no capacity to symbolize the things that are important. When psychiatrists talked to psychologists, or anthropologists, or sociologists who knew about research, the "research specialists" would take the clinicians' words literally and forget the context. They would forget the complexity and then do asinine things. There is no sense in being accurate when you aren't in the right ball park. If you're not in the right ball park, then you might as well be sloppy about accuracy and think very hard about how to avoid the inconsequential until you get a new idea worth exploring. The problem is to get in the right ball park, and we didn't have the tools in the old days to get in the right ball park. We couldn't measure ongoing action as it occurs, what I call "the growth edge of change." In the past, we always had to be referring back to something that we'd stopped still. What we need to be able to do and what we can do in this new age of measurement is to measure things as they happen. I say that the architect will have a place when he is able to master some of these new techniques of science.

CARL KOCH FROM THE FLOOR.

I would like to ask Mr. McHale where he would go and to whom he would apply, other than Bucky, if he were a young man interested in the 400 million people who need to be housed. Where he would go assuming he wouldn't go to any architectural school in the United States.

JOHN McHALE. That's pretty tough, you see, because people have assumed that architecture was looking after this problem. There's no one else looking after it, and suddenly there is a gap much the same way as there is a gap in the problem of congestion in cities and in pollution. There's a gap in all of these urban ills, but we thought that someone was looking after them. This does not exist and this is what I keep trying to suggest to you. If it doesn't exist, create it. You have a very large, very prestigious professional organization, the American Institute of Architects. Does it have any solution to urban congestion? Has it laid out the plans for the next 10 years? Or the next 35? I haven't noticed them.

Question concerning methods of going at this research by architects. Are any sources being missed?

BERNARD P. SPRING. Everything worthwhile that's done in the area of architectural research is fully reported in the professional magazines that you read. That's all there is.

It would seem to me that a great many of the specialists things in architecture could be computerized. Just as feed back systems and computers have possibly made politics obsolete at this point, possibly they will soon make other specialized areas obsolete and give us as human beings the opportunity to go on and solve the real problems which are those of bringing things together. Why couldn't a whole hospital be done on a computer at this point if given the proper feed back system?

DONALD KENNEDY. It seems to me that before a computer can do anything, we have to feed it information and be able to tell it what to do. And with no unified theoretical framework and little empirical data, how shall we know what to tell the computer?

You have the feedback instruments available now.

JOHN McHALE. We have to have some kind of theory or model to test out the computer.

DONALD KENNEDY. Let me speak about the usefulness of a file computer. Let's not theorize about what a computer *might* be able to do. Rather, let's put it to work on what it can do right now for any large architectural office. Fantastic volumes of documents, specification manuals, and diagrams are available. New material is arriving every day. Although this information is tremendously useful in exploring design possibilities and in writing specifications, it is very difficult with present methods of storage and retrieval to bring this data quickly to bear on the problem at hand. The modern file computer can be of considerable assistance here if architects will invest time and money in the conversion process.

JOHN McHALE. People generally want to recover information to help them make a decision. For some years, there's been work on improved filing systems extending into computer filing of information. The stumbling block has always been the nature of the decision-making process used by architects. We have not yet been able to clarify that and that's a key to any retrieval system. We have various ad hoc retrieval systems. In England they have SFB which is very sophisticated, yet I've just been reading a series of articles which explains all of the drawbacks and pitfalls of even that system. The difficulty lies in what I call software that goes before the hardware of the retrieval system, that is, an understanding of the decision-making process itself and the reasons that you need information in the first place.

WARREN BRODEY. I work at NASA part of the time on man-machine systems in a computer laboratory, and we have some knowledge of what's going on in the computer field. What one can do with computers is fantastic. The only problem is having the imagination to really use them. Now, for example, there is something called multi-processing. You take a complex body of information, you don't have to simplify it the way you did in the past, and you work with the complexity all at once and try and find out the characteristics of the whole system. In the traffic business, we've made a fair amount of progress. The problem at the moment is that you have to type in specific commands, and people are used to *talking*. Some people have ideas in their fingers, many have ideas in their mouths and in their bodies. The variety is important. What we are trying to do for the space environment is to enable the astronaut to have contact with the computer by more modalities than just his fingers. We are working on the problem of being able to give spoken commands to the computer and have it act in response. We are also working on the problem of having the computer speak back. Some people think that these devices can only follow recipes. As the computer is given more recipes including those telling how to rearrange these into new recipes, it is able to learn and can come up with conceptions and surprises that you would never have anticipated. You have a body of knowledge; you have rules and these rules can be specified. You need a place to put an hypothesis which is a complicated hypothesis. You haven't got it specified, you are guessing, you are not sure you're right. You put the hypothesis into the system and essentially it activates a test situation to see what will happen. In a simulated environment we can put a man in a room and then send him signals via his ears as if there were windows in the room. We are beginning to be able to see the effect of the windows while the whole system is reactive to the small initial effect, the interdependence of timing, context, and form is well known to the artist. We can work with this kind of artistic building the environment by simulation while we and the machine search for concepts which explain. This is synthesis, and this is testing out things so that we don't have to go back to analyzing them into the simplest pieces, because the total of the component pieces does not represent the whole.

I'd like to ask Kennedy, who said that the architect has no concept of what research really is, does the problem not fall back on the architect and the way schools are then set up?

DONALD KENNEDY. I think the problem also relates to a transformation that has been taking place in our society for approximately 400 years. According to Everett Mendelson and others who have written on this subject, there is a certain kind of gradual increment in the way science has permeated many aspects of our life experience. We are not really aware of the changes until we hear something like "the majority of the drugs now dispensed by physicians did not exist 10 years ago." This kind of factual statement brings you up short. The way science penetrated into the major universities of this country and Europe teaches an important lesson, because science didn't start in the universities and the universities resisted it for a long time. The same kind of resistance exists in certain graduate departments in the universities today, notably in schools of law, education, divinity and architecture. But, it seems to me that departments of architecture in this country, as well as practicing architects, are operating close to the margin. You lack any real resources to develop a

more scientific stance and that's why the conversation keeps coming back to research funds. The money is available, but it takes skill and trained professionals to write proposals and to conduct successful research projects. I would advise architects to spend more time associating with accomplished researchers in other departments of the university.

CAN THE ARCHITECT COLLECT INFORMATION?

JOHN McHALE. The amount of information available in this country staggers the imagination and most of it is at the end of a telephone. Few architects use the Defense Documentation Center, or have even heard of it. A FREE information service that has access to the most advanced, scientific information in the country. And that would be, of course, in the world, because the U.S. is pretty far advanced. You have an idea, you call a number, and you get back a full Xeroxed copy. Now this might be for such a thing as a handbook of Bioastronautics. It provides the most complete compendium about all that's known about the human organism. If you're working at a university which has military contracts it costs two minutes to write down the number, and that's the total price. The architect has no way of getting this information because he is so mal-educated, in relation to information generally. He doesn't have the scientific attitude or the relation to the environment that we automatically assume nowadays.

You might say that the end product of a good architectural education is a good building, and I don't think architects ever agree on what is a good building. I sense that this architectural vocabulary of a good building has almost no place to plug in the kinds of discussion that went on this afternoon. I suspect there are two different vocabularies of working. I wish someone could add a little more insight as to how the well-educated architect or student of the future might get this. At present as things exist, I don't think they have it at all.

WARREN BRODEY. If you could take a building up into space, you could see if you could stay alive in it. It's a lot simpler for the space agencies and the defense agencies because there are stringent requirements which are well defined. You die if you don't have the environment set up correctly.

I'd like to ask Dr. Kennedy and any other panelists to respond to the following question based on the reaction of a friend of mine. He is a man who has addressed architects nationally and perhaps internationally for some time. He gets very perplexed as to what the architects are receiving from his information when he shows them birds sitting on a telephone wire and people queued up for a bus. Just what is being received by the architects? He wonders whether they see more than an interesting photographic composition. How successful are you in communicating your areas of information to architects in the associations that you have had?

DONALD KENNEDY. That's a nice question. I can think of one example, having spent three years working full-time with an architectural designer by the name of Delbert Highlands who is now at Carnegie Tech in Pittsburgh. About a year ago we were writing a final report for a research project. We each wrote several chapters, read each other's manuscripts in draft form and made suggestions about anything that might have been omitted or ambiguously expressed. Usually we experienced little difficulty in communication. At times we had to take care not to write about each other's specialization. However, our hundreds

of hours of interaction produced a large area of common knowledge and sensitivity. Certainly in this instance there was a fair amount of understanding and easy communication, yet at times difficulty arose because of the technical vocabulary of the different disciplines. To an anthropologist, "orientation" refers to psychological attitudes, not to the placement of a building in relation to the sun. It takes a little time to discover these differences in language.

In the last analysis, the architect is always more interested in the physical structure and the aesthetic visual form of a building; and I am more interested in people and how they feel about a structure and how they use it for entirely different things after the architect and builders have gone away. For some reason, architects seldom do any follow-ups. Just as physicians never know what happens to their patients and schools never know what happens to their pupils, architects seldom know what happens to their buildings. Somewhere along the line there needs to be a more continued expression of concern over occupancy and the interplay between human beings and shelters that we have been talking about. These two worlds are hard to bridge because most of the social science disciplines have paid little attention to man's relationship to his man-made environment.

I go back so far that I graduated from Harvard at the time they had a School of Architecture and so called it. I went to work for the Corps of Engineers at the beginning of the war. When they wanted a site for 33,000 men and 10 days to find it, dispose of sewage, find the fresh water, and so forth, the architect was the one selected. He had to find a 10,000 bed hospital for a bunch of men coming back from Africa within 6 weeks, handle the ammunition and all the things. The book was that thick and it was the architectural training. I didn't know these things, but I knew how to get in touch with the best sewage disposal handler, water men, anything that you can think of and it was in this book and it was covered. Now that was an architect's training? No. Secondly the computer and the specifications. Now you do one simple thing for the Army, just build a one story platform and you have to refer to every specification from the government. So you need the computer. But that is the government taking over, and that is your New Society. Not knowing what goes on.

How do anthropologists know whether people are happy about buildings?

DONALD KENNEDY. If I understand your question correctly, you are asking how to obtain valid information from people who have been occupying and using a structure for a period of time. In general, there are reliable methods of questioning people so as to obtain this response, but I would put it in one proviso from my experience in rambling about the pediatric hospital. Most people's relationship to a structure and their response to it lie outside of their conscious awareness. From a question-and-answer game, you can't be too sure of getting the kind of information you really want. It could be that observation of actual behavior or movement, or of some of the things Dr. Brodey talked about earlier, would give a better indication of how they were responding to this structure as compared to one previously occupied. It is a difficult area to tap, because many questions that are obvious to you are not readily understood by the people who use a building. This is a sad commentary on the gulf between the "makers of

buildings" and the "users of buildings." The great majority of the present-day population go worrying through life without knowing how to identify or consciously communicate their emotional states. This is the reason why psychiatrists have difficulty in explaining what they are driving at. I would like Dr. Brodey's reaction to this thought.

WARREN BRODEY. Again, the problem is a problem of movement. A building evolves its purpose and as it evolves it changes its people, because they are changed by the building. Will we scientifically study this dialogue? The building becomes a different building to them as they live in it, and one has to define essentially (1) what is the response? Right now, what do they think of it? How do they move in it? (2) What is the effectiveness of the building? Now the effectiveness of the building isn't the same as the evolutionary effectiveness of the building. You put people in a building which they hate because they are not used to it and when a year rolls by they are functionally more skillful and more able to get things done than they ever did before, and maybe by that time they like the building. This is like good art; it changes from moment to moment. We do have a difficult time evaluating such evolving relationships, but it can be done. Not by taking some simple standard, but by using some of the many different avenues of information available and then using the computer to help deal with this. At the same time, we have to set standards of evaluation not only for the static but also in terms of the evolutionary and teaching potentials of the building and then in terms of people's function and also efficiency as defined by the purpose of the building. I think the architect's problem is a very real one and it's not just a matter of what you haven't done or haven't read. There haven't been the tools for really explicit evaluation in the past but these tools are coming.

EZRA EHRENKRANTZ. I think the problem is complex and I see it in terms of an office that practices in some respects traditional architecture and in other respects becomes involved in developments. Here, when we try to pose a problem as to the type of user requirements for a project such as a resident hall, and send surveys out or interview people, we frequently get answers based on how they react to the building they are in. The ability to pose problems or questions so that you can get valid answers becomes exceedingly difficult whether you are trying to work with students or with people you may be polling. We have a great deal of difficulty in the resident halls getting any kind of valid information as to why students move out of the buildings. When we can finally get the data we found students moved because of the parietal rules that the institution put on the building. The building itself worked much better than one might anticipate. The way in which a building is used or run may determine whether or not the people in it like it. In the work with the school districts, we found that the average middle-aged teacher with poor circulation tended to turn the thermostat up because of air stratification due to the way we normally specify temperature control at the breathing level. The temperature was frequently so high that the children were drowsy. By setting requirements with respect to a six inch level as well as the breathing level, we were able to compensate for this requirement. There are many aspects of the problems relating to buildings on a physiological level where data can be developed for ready analysis and those people in the appropriate disciplines who are competent to do the work can in fact do it very well.

EVENING DINNER

the necessity of discipline and order in our society, which could manifest itself in the profession and through design. On Monday we had a dinner for the Alumni, the first in the history of the architectural Center. The alumni met with students and were privileged to hear the reminiscences of two giants of the architectural world, Edward Durell Stone, a student at the BAC in 1922, and Buckminster Fuller, a long-time friend of the Center. On Monday the Producers Council sponsored a buffet. We are most grateful to them and the commercial exhibitors whose contributions enabled us to finance the week's activity. Tuesday the Associated General Contractors held a rewarding lunch with officers of the Boston Society of Architects and the BAC. The AGC had their annual dinner here that evening. On Wednesday the Engineers had a full program and on Thursday the Boston Society of Architects held a cocktail party and among the distinguished guests present were I. M. Pei and Dr. Julius Stratton, President of MIT, who received the Parkman medal.

Then last evening, we opened our second Boston Architectural Center Conference with a seminar on Forces Shaping the Role of the Architect. And today has been a most gratifying day with two seminars held here. We hope to have a publication which will fully record for posterity the thoughts emerging from this conference. Obviously, it would be impossible for me to summarize the subjects covered in these sessions today. I want to take this opportunity though to thank the panelists who have so generously given of their time and have made such meaningful presentations. They have given much food for thought and it is my hope that we can develop some of their ideas in more depth in the future conferences. The working committees deserve our deepest appreciation, they have toiled long and diligently. The events of this week have proved the fruits of their efforts. This week's activities have also seen the fruition of a long planned dream of the Center. The BAC has truly become a focal point for the profession.

It is fitting tonight that we should have as the final speaker a man who holds the highest elected position in the architectural profession. An active New Yorker, architect, founder and head of his own firm, designer of buildings in 30 of the 50 states of the United States, our speaker has a wide range of experience in department design. He is author, teacher, critic and lecturer. Past President of the Architectural League of New York and the Municipal Art Society of New York. I am indeed honored to present you with Mr. Morris Ketchum, Jr., Fellow of the American Institute of Architects and current president of the American Institute of Architects.

MORRIS KETCHUM, JR.

It is a memorable and moving experience for me to come here and speak to you, and, even more than that, to take part in something as exciting as the dedication of the Boston Architectural Center. Here, if anywhere, we can see the ideal marriage of the old and the new—the ferment and bubbling of fresh, young ideas and actions in a city aglow with tradition and history, a city which is plunging into the future without losing the mellowness and charm of the past.

The dedication of this new wonderful building and this conference on the future of architecture are an appropriate occasion to pause and look around us at the world we live in, at the forces which have shaped and are shaping that world, at the role which

INTRODUCTION PAUL CARROLL

It's a pleasure to have you all here tonight, particularly those who have survived this week's activities. I'm not too sure whether I am either vocal or literate at this particular point. I've been here since midnight last Saturday, and I beg your indulgence. We've had a great day today and I think it's wonderful to culminate with this high point this evening.

This week has been most rewarding to all of us at the Center, starting with the activities last Sunday. The dedication ceremony with the Governor, Mayor Collins, and other distinguished guests launched the Center with good wishes for our future. Dr. Gropius delivered a most thought provoking presentation stressing



JAMES F. COYNE

we, as architects, must play in providing a setting for the society which these forces have created. Like the Roman god Janus, we must look backward to the past at the same time we look forward to the future. The century just passed is the foundation for the century to come.

More than a hundred years ago, the architect was a craftsman chiefly concerned with the design of individual buildings and their immediate surroundings. Occasionally in the expanding world of the growing America, he had the opportunity for larger concepts—a campus like the University of Virginia, new towns on the banks of the Mississippi or in the heart of the Rockies, a master plan for the nation's capitol. These were the exceptions, not the rule.

The furious energy and headlong pace of our country's growth gave little opportunity for anything but haphazard planning and overnight construction. Habits of thought and habits of building were established which still persist today in spite of the fact that our society and its setting have matured and grown mellow with the disappearance of the last frontier. Our land, our air, our water, our space for living are dwindling but we still exploit them, wastefully and wantonly, as if we had just landed on a new continent.

The forces which made such accelerated national growth possible were the forces created by a new industrial age. The railroad, the automobile, the airplane replaced the covered wagon and the horse and buggy. Steel and concrete replaced wood and cast iron in our structures; elevators and escalators replaced stairways, man made materials replaced bricks and mortar, wood and stone. The limited building vocabulary of the pre-industrial age expanded and is still expanding into a complicated language of prefabricated units of every type and material.

The art of architecture has become a science based on art. To master this art and science, the individual practice of architecture has become team-work, both within each architectural organization and with the allied professions concerned with building.

The society which architecture serves has also changed. A century ago it was largely a rural society. The vast majority of all Americans then lived on the farm; the vast majority now live in cities. The forces which shape today's world are urbanized. Architecture has always served mankind and it has never had a better opportunity to serve him. For the design of cities has been, is now, and always will be the province of the architect.

Our urbanized society still inhabits cities planned for another age, bursting at the seams with traffic congestion, ill adapted to the social, economic and political demands of today's urban living and ripe for rescue and redevelopment. The time is long overdue for a new urban architecture.

To create this architecture, the architect must deal with new urban clients. They are not individual clients with whom he can talk face to face. They are impersonal clients—the corporation, the private foundation, the government agency—whom he never meets face to face and with whose representatives he often finds communication difficult and, sometimes, impossible.

It almost seems that the strong individuals who commissioned the great architecture of the past would never emerge from the rising tide of mass culture. However, the great individual clients are returning today as merchant princes, business executives,

and, in a few encouraging instances, as leaders of government. They are taking on the big, new urban tasks—redeveloping neighborhoods and cities, breaking ground for new towns and satellite cities in the open countryside.

To talk with these clients and his real client, the public, the architect has been forced to develop new ways and means for mass communication.

Our profession has been called, amongst other things, the one least enthusiastic about group action. Yet as an individual, unaided by his fellows, the architect's voice is a small one seldom heard. As a total profession, united in a vital, well organized professional society, he is heard throughout the land. We are making tremendous progress as a profession in establishing that today's architects are helping to reshape the face of America.

They are a new generation. What Fortune Magazine called "the tweedy old profession of architecture" and the eclectic buildings it produced died with the great depression. Architects now realize that the future of architecture lies in creative action toward the betterment of mankind and his surroundings.

Something has been lost as well as gained. There is considerable charm in the picture of the long lost Victorian architect of Boston, Philadelphia and New York—that dignified gentleman of impeccable elegance who was aloof from vulgar considerations of budgets, terribly attractive to clients' wives and occasionally inspired by six martinis to return to his studio and create a masterpiece. Romance has yielded to realism; the smock has been displaced by the gray flannel suit.

The new realism is based on the teamwork concept both within each firm and with the many consultant professionals who work with the architect. It embraces many new production methods and procedures, such as the critical path method, which depends on the use of computers. In spite of all this actual and potential organizational efficiency, the last thing our profession needs to become is a colony of organization men, dealers in economic data and fiscal formulae who can provide everything but the craftsmanship, functional planning and beauty which emerge from architectural design. The production of architecture must always allow for individual inspiration.

To produce the best in architecture, we need all of us better tools with which to build. To obtain them, architects and other design professionals must work with the total building industry, including manufacturers, contractors and labor, to reorganize and modernize that industry in terms of today's technology. For in spite of a large share of intelligent and progressive leadership, it is still the victim of restrictive practices and obsolete procedures. More and better prefabrication, less field assemblage, is needed. More manufacturers of separate but related items, materials and equipment must collaborate in the production of overall construction systems. Obsolete building codes must be discarded or revamped to clear the way for progress.

You are familiar with the California School Systems Development, a research project brought into being under the guidance of Ezra Ehrenkrantz of Building Systems Development, Inc. This project, based on the needs of thirteen school districts in order to broaden the base of ultimate product usage, has set a remarkable precedent.

The integrated use of prefabricated structural, air conditioning,

lighting, ceiling and interior partition systems for school buildings made it possible for industry to fabricate and bid on a mass production basis. The advantages of interindustry collaboration to both industry and architecture were vividly demonstrated.

I submit that the building industry does not need to wait for other pilot projects such as this to collaborate, in other fields of building, on composite systems which interrelate the products of many manufacturers. What has been done for the automobile industry can be done for the construction industry. Nor would this mean mass production of similar buildings. The architect can use these new systems to produce individual architecture.

Like the building industry, the architect must demonstrate that he is capable of growing with the growth of our country. He must prove and he is proving that his profession can devote its skills, energies and deep devotion to providing a physical solution for the social, economic and political problems which confront all of us today.

I don't believe that architects can do the job alone. We are not supermen. We are the servants of society, not its masters.

A great pool of talents and skills—the assembled brainpower of our political leaders, sociologists, physical scientists and educators—is needed to establish a great new urban program. Then this program can be translated into the environmental architecture of cities by the architect and his allies—the design professions, the product manufacturers, the builders, the craftsmen. A total building industry is needed for a total answer.

The future of urban life, the life that the great majority of Americans live, depends upon the solution of complex and interrelated problems. A great many people must pool their intellects and energies to resolve these problems; solutions must be arrived at before technology can be harnessed and political, economic and social purpose can be translated into meaningful urban architecture. Only the architect and his fellow professionals have the training and skill to create three-dimensional communities based on these programs.

This, then, is our responsibility. But we cannot discharge it or even understand it if we wait passively for others to tell us what needs to be done. It is by establishing a continuing interrelationship with the community, government, and the building industry that we can truly serve as professionals making a worthy contribution to society.

The question confronting us is whether or not we, as individuals and as a profession, can meet that challenge.

Consider some of the problems that confront us.

The forces that shape the architect are the forces that are shaping—and misshaping—urban society. What are these forces?

We are already using an obsolete language when we talk about "cities" as self-contained urban entities. Is New York or Los Angeles really our largest city? Or is it that glittering mass that sprawls from southern New Hampshire to the port cities of Virginia and contains forty million people? If you want to be a bit tidier in your demography, you might call our biggest city that urban blotch around the New York-New Jersey area which houses some seventeen million souls. A recent study of the Bureau of Census shows that, for the first time, the total population of the suburban areas has exceeded the total population within the boundaries of our traditional cities.

The human desire to "move out" is as old as our pioneer beginnings, and it cannot be denied. People moved out of our central cities in an orderly fashion, more or less, when the inter-urban railway lines were developed. When the automobile became a mass-production reality, it became possible to drive off in any direction. All you needed was a car, gasoline, a highway engineer, public tax money, and a slogan that equated the word "highway" with "progress." We had all these things, and here we are today.

While we want cars and roads, we do not want them on our lawns and destroying our urban neighborhoods. We need a balanced transportation system and all of us must point out to our legislators that it is odd indeed to spend billions of dollars of public money on highways and call it free enterprise at work while we deny money to urban rail systems and look on it as some dark form of socialism. Here is an example of a situation in which good urban design and livable cities simply cannot be created unless heavy political pressure is applied, the public will is aroused, and special interests and lobbies are brought under control. Consequently, a peculiar responsibility for bringing this about belongs to the architect.

The relationship between our profession and government at all levels is crucially important if urban problems are to be solved. As the city has come apart, traditional political boundaries have become blurred and virtually meaningless. Where the states have defaulted in representing urban majorities, the Federal government has moved in to fill the void. Local government, meantime, has been slow to bring the speculator under control. He has been allowed to build without plan or relevance to the needs of the community. The entrepreneur has been allowed to fill the countryside with the junk and litter of affluence and disorder.

At the same time, archaic zoning regulations are preventing architects and enlightened clients from building compact and stimulating communities rather than endless rows of dreary suburban bedrooms. At both the local and national level, the tax structure penalizes the man who tries to build something better and rewards the man who builds shoddily, allows his property to deteriorate or maintains a slum.

Our New England forefathers relied on planning and strict community regulation to prevent these excesses; we have misread our own history and concluded that the needs of the community are subordinate to the making of individual profits.

Nor can we re-make our cities without solving our painful social problems. As blight, congestion, and lack of decent housing drive middle-income residents from our urban centers, the poor move in. They continue to leave the rural areas for the crowded urban centers. Because of the lack of education and job skills—often, too, because of prejudice—they work part time or are unemployed. The gap between the rich and poor grows. The suburban noose draws tighter. If the present trend continues, the untrained and uneducated poor will become the dominant population group in virtually all our major cities within the next few years. The consequences of allowing our cities to become the poorhouses of America had better be recognized while there is still time to avoid them.

Each of these problems—technological, political, social, economic—confronts us with harsh realities which stand in the way of a better urban life and a better urban architecture.

The architect's greatest contribution to this age of ours will not

lie in the development of new structures as much as in awakening the American public to the urgent need to build a better foundation for the future of the nature we serve.

The public is beginning to awaken. On the political front we finally have a national administration and a Congress which is taking an interest in the quality of urban life. Behind government is a growing public revolt against the drab mediocrity of our cities and our countryside. Business and industry are beginning to realize that time is running out for policies based on blind exploitation and senseless waste. Community leadership is seeking the road to a brave new world.

Across the nation, our profession has helped to create soul stirring examples of what our cities could be if all worked together to rescue and rebuild them. Larger cities like Boston, Philadelphia, Baltimore, Detroit and San Francisco; smaller cities like Little Rock, Hartford, Urbana and Canton, have planned or built, or are building, new communities worth living in. These are the cities of the future.

Given a sympathetic government, an enlightened public, community mobilization, the full use of professional talents and a revitalized building industry, we can create a new architecture.

It will not be an architecture set within the close boundaries of stylistic formalism nor an architecture which has lost the vital urge to explore new ways and means of expressing the social, economic and technological demands of our age.

It will be more than an architecture of individual buildings, more than a perpetual search for novelty in structure, form and materials, more than a haphazard assemblage of either technological brutalism, space age vulgarity or instant history.

In city or country, it will be an architecture of quiet serenity, of properly organized space within and around its buildings, of form appropriate to our own age, and of a visual delight capable of enriching the minds and hearts of those who live within its boundaries. It will be an architecture of controlled and balanced auto traffic and public transportation, of urban neighborhoods where close knit building groups and green open spaces add diversity and spice to living, of well organized satellite cities within easy reach of unspoiled nature, and of a restored and revitalized countryside.

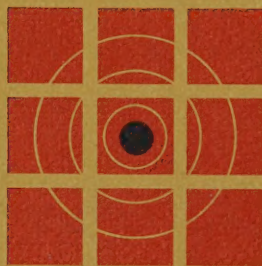
This total architecture, ladies and gentlemen, will serve such diverse physical and spiritual needs of man as housing, trade, recreation, education, industry, business, art, science and government. It will form their needs into an overall environment worthy of the richest nation on earth.

We must keep our eyes fixed on this goal.

Today, we are an affluent profession in an affluent society. If we allow ourselves to be submerged in the day-to-day demands of our own prosperous workloads, ours will be a petty triumph soon forgotten. Failure to give a full measure of devotion to the demands of function, craftsmanship, art, and science which architecture must fully satisfy will mean that others will fill a gap we ourselves have created.

On the other hand, if we apply patience, fortitude, courage and unselfish devotion to the task before us, we will broaden the total horizon of architecture and our own achievement.

That is the bright future of architecture. Let us all join forces to bring it within our grasp.



BOSTON ARCHITECTURAL CENTER 320 NEWBURY STREET BOSTON MASSACHUSETTS